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A Guidebook on How to Comply with the Shipbuilding and Ship Repair (Surface Coating) Operations National Emission Standards for Hazardous Air Pollutants

A GUIDEBOOK ON HOW TO COMPLY WITH THE SHIPBUILDING AND SHIP REPAIR (SURFACE COATING) OPERATIONS NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

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Emission Standards Division
Office of Air Quality Planning and Standards
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

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CHAPTER 1

INTRODUCTION

BACKGROUND

In November of 1995, the U. S. Environmental Protection Agency (EPA) issued national regulations to control hazardous air pollutant (HAP) materials from shipbuilding and ship repair facilities designated as major sources. The regulation appeared in the December 15, 1995 edition of the Federal Register [volume 60, beginning on page 64330].

Why is EPA regulating the shipbuilding and ship repair industry? Section 112 of the Clean Air Act as amended in 1990 (CAA) requires the EPA to evaluate and control HAP emissions. Pursuant to Section 112(c) of the CAA, the EPA published in the Federal Register the initial list of source categories that emit HAP on July 16, 1992 (57 FR 31576). This list included shipbuilding and ship repair (surface coating) operations as major sources of HAP emissions.

The CAA was created, in part, "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and productive capacity of its population" 42 U.S.C. §7401(b). The final regulation will protect the public health by reducing emissions of HAP material from surface coating operations at shipbuilding and ship repair facilities.

Approximately 35 shipyards are estimated to be major sources of HAP emissions, emitting over 9.1 megagrams per year (Mg/yr) (10 tons/yr) of an individual HAP or over 23 Mg/yr (25 tons/yr) of total HAP, including toluene, xylene, ethylbenzene, methanol, methyl ethyl ketone, methyl isobutyl ketone, ethylene glycol, and glycol ethers. All of these pollutants can cause reversible or irreversible toxic effects following exposure. The potential toxic effects include irritation of the eyes, nose, throat, and skin, and damage to the blood cells, heart, liver, and kidneys.

All existing major source facilities must be in compliance with the requirements of the regulation on December 16, 1997. The final standards will reduce nationwide HAP emissions from shipyard surface coating operations by at least 318.5 Mg/yr (350 tons/yr) from a baseline level of 1,362 Mg/yr (1,497 tons/yr).

PURPOSE OF GUIDEBOOK

The purpose of this guidebook is to provide

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CHAPTER 2

OVERVIEW OF THE REGULATION

The final regulation is applicable to all existing and new shipbuilding and ship repair facilities that are major sources of HAP or are located at plant sites that are major sources. Major source facilities that are subject to this regulation must not apply any marine coating with a volatile organic HAP (VOHAP) content in excess of the applicable "as-applied" limit and must implement the work practices required in the regulation. In addition, these sources must keep specified records and submit periodic reports.

APPLICABILITY

Section 112(a) of the CAA defines major source as a source, or group of sources, located within a contiguous area and under common control that emits or has the potential to emit, considering controls, 9.1 Mg/yr (10 tons/yr) or more of any individual HAP or 22.8 Mg/yr (25 tons/yr) or more of any combination of HAP. Area sources are stationary sources that do not qualify as "major" on the basis of their "potential to emit". "Potential to emit" is defined in the Section 112 General Provisions (40 CFR part 63.2) as "the maximum capacity of a stationary source to emit a pollutant under its physical or operational design." To determine whether or not it is a major source subject to the rule, a shipbuilding and/or ship repair facility would need to determine the total HAP emissions from its surface coating operations, as well as the total HAP emissions from all other operations at the plant site. The sum of these emissions would be used to determine major source status. See Chapter 3 for additional information. The term "affected source" as used in this regulation means the shipbuilding and ship repair facility that is subject to the regulation.

COMPLIANCE SCHEDULE

EXISTING SOURCES--

Effective Date: . . . . . **December 15, 1995**

Initial Notification Due: . . . . . **June 13, 1996**

Implementation Plan Due: **December 16, 1996**

Compliance Date: . . . . . **December 16, 1997**

First Reporting Period Ends: . **June 16, 1998**

First Compliance Report Due: **August 16, 1998**

NEW SOURCES--

Initial Notification and Implementation Plan Due: . . . . **6 months prior to start-up**

Compliance Date: . . . . . **Date of start-up**

First Reporting Period Ends: . . . . . **6 months after start-up**

First Compliance Report Due: . . . . . **8 months after start-up**

REQUIREMENTS

In general, the regulation specifies:

- VOHAP content limits on marine coatings
- Work practice standards

- Recordkeeping
- Reporting

Each of these requirements is summarized in the following sections.

VOHAP CONTENT LIMITS

No coating may be applied to a ship with an "as-applied" VOHAP content exceeding the applicable limit in Table 2-1. "As applied" includes any thinning; therefore, it is important to use only compliant coatings and not exceed the maximum thinning allowance (if any) for each and every coating.

The final standards impose limits on the VOHAP content of 23 types of coatings used at shipyards. Compliance with the VOHAP limits must be demonstrated on a monthly basis. The promulgated standards include four compliance options to allow owners or operators flexibility in demonstrating compliance with the VOHAP limits. The final standards also allow for an alternative means of compliance other than using compliant coatings, if approved by the Administrator. The Administrator shall approve the alternative means of limiting emissions if, in the Administrator's judgment, (after control) emissions of VOHAP per volume solids (nonvolatiles) applied will be no greater than those from the use of coatings that comply with the applicable VOHAP limits.

WORK PRACTICES

The regulation includes work practice standards to ensure that air pollution resulting from transfer, storage, and handling of paints and solvents associated with surface coating operations are minimized or eliminated. (See § 63.783(b)(1) and (2)).

The final standards also require that all handling and transfer of VOHAP containing materials to and from containers, tanks, vats, vessels, and piping systems be conducted in a manner that minimizes spills and other factors leading to emissions. (This requirement includes hand- or brush-application of coatings.) In addition, containers of paint, thinning solvent, or waste that hold any VOHAP materials must be normally closed (to minimize evaporation) unless materials are being added to or removed from them.

RECORDKEEPING

The regulation requires sources to keep monthly records to document compliance with the regulation. The required documentation includes:

1. All documentation supporting the initial notification;
2. A copy of the affected source's approved implementation plan;
3. The volume of each low-usage-exempt coating applied during the month;
4. Identification of the coatings used during the month, their appropriate coating categories, and the applicable VOHAP limit;
5. Certification of the as-supplied VOC content of each batch of coating and thinning solvent used during the month;
6. A determination of whether containers meet the standards as described in § 63.783(b)(2);
7. The results of any Method 24 or approved VOHAP measurement test conducted on individual containers of coating and thinning solvent, as applied; and

8. Additional information, as determined by the compliance procedure(s) that each affected source followed.

An example monthly record is provided in Appendix F. If the source you operate qualifies as an area source or a synthetic area source, you only need to record the total annual volume of coating applied to ships. All records must be kept and maintained for 5 years. A summary of recordkeeping requirements is provided in Table 2-2. (See also Chapter 6 and § 63.788(b).)

REPORTING

For affected sources, the regulation requires an initial notification that you are subject to the regulation, an implementation plan, an initial compliance status report, and then compliance status reports every 6 months. A summary of reporting requirements is provided in Table 2-2. (See also Chapter 6 and § 63.788(c).) An example initial notification is also provided in Appendix D.

For major sources that intend to become (synthetic) area sources by the compliance date, the regulation requires an initial notification that documents your intention to apply an enforceable limitation to keep actual HAP emissions below the major source level(s).

UNITS OF MEASURE

The NESHAP uses the International System of Units (SI) defined in *Standard Practice for Use of the International System of Units (SI) (the Modernized Metric System)*, published by the American Society for Testing and Materials as publication No. E 380-91. The EPA guidelines require that SI, or metric, units be used. See reference (cover page) on page 8 of this document. Many of the existing State regulations involving marine coatings are expressed in metric units (i.e., grams per liter, g/L). The Metric Conversion Act of 1975 (Section 3 of Public Law 94-168) also supports this approach for the NESHAP units of measure and the examples in this guidebook for demonstrating compliance with the NESHAP.

TABLE 2-1. VOLATILE ORGANIC HAP (VOHAP) LIMITS FOR MARINE COATINGS

Coating Category	VOHAP limits[a,b,c]		
	grams/liter coating (minus water and exempt compounds)	grams/liter solids[d]	
		t $ 4.5EC	t < 4.5EC[e]
General use	340	571	728
Specialty	--	--	--
Air flask	340	571	728
Antenna	530	1,439	--
Antifoulant	400	765	971
Heat resistant	420	841	1,069

TABLE 2-2. SUMMARY OF RECORDKEEPING AND REPORTING REQUIREMENTS

Requirement	All options		Option 1		Option 2		Option 3	
	Rcd.	Rpt.	Rcd.	Rpt.	Rcd.	Rpt.	Rcd.	Rpt.
Initial notification (§ 63.9(a)-(d))	T	T						
Implementation plan (§ 63.787(b))	T	T						
Volume of coating applied at unaffected major sources (§ 63.781(b))	T							
Volume of each low-usage-exempt coating applied at affected sources (§ 63.781(c))	T	T						
ID of the coatings used, their appropriate coating categories, and the applicable VOHAP limit	T	T						
Determination of whether containers meet the standards described in § 63.783(b)(2)	T	T						
Results of M-24 or other approved tests	T	T						
Certification of the as-supplied VOC content of each batch	T							
Certification of the as-applied VOC content of each batch			T					
Volume of each coating applied			T	T				
Density of each thinner and volume fraction of solids (or nonvolatiles) in each batch					T	T	T	T
Maximum allowable thinning ratio(s) for each batch					T	T	T	T
Volume used of each batch, as supplied					T	T	T	T
Total allowable volume of thinner					T	T	T	T
Actual volume of thinner used					T	T	T	T
Identification of each group of coatings and designated thinners							T	T

Note: Option 4 requirements parallel those shown for Options 1 through 3, depending on whether or not and how thinners are used. When using Option 4, the term "VOHAP" should be used in lieu of the term "VOC".

-CITE-
15 USC Sec. 205a 01/24/94

-EXPCITE-
TITLE 15 - COMMERCE AND TRADE
CHAPTER 6 - WEIGHTS AND MEASURES AND STANDARD TIME
SUBCHAPTER II - METRIC CONVERSION

-HEAD-
Sec. 205a. Congressional statement of findings

-STATUTE-
The Congress finds as follows:
(1) The United States was an original signatory party to the 1875 Treaty of the Meter (20 Stat. 709), which established the General Conference of Weights and Measures, the International Committee of Weights and Measures and the International Bureau of Weights and Measures.
(2) Although the use of metric measurement standards in the United States has been authorized by law since 1866 (Act of July 28, 1866; 14 Stat. 339), this Nation today is the only industrially developed nation which has not established a national policy of committing itself and taking steps to facilitate conversion to the metric system.
(3) World trade is increasingly geared towards the metric system of measurement.
(4) Industry in the United States is often at a competitive disadvantage when dealing in international markets because of its nonstandard measurement system, and is sometimes excluded when it is unable to deliver goods which are measured in metric terms.
(5) The inherent simplicity of the metric system of measurement and standardization of weights and measures has led to major cost savings in certain industries which have converted to that system.
(6) The Federal Government has a responsibility to develop procedures and techniques to assist industry, especially small business, as it voluntarily converts to the metric system of measurement.
(7) The metric system of measurement can provide substantial advantages to the Federal Government in its own operations.

-SOURCE-
(Pub. L. 94-168, Sec. 2, Dec. 23, 1975, 89 Stat. 1007; Pub. L. 100-418, title V, Sec. 5164(a), Aug. 23, 1988, 102 Stat. 1451.)

-REFTEXT-
REFERENCES IN TEXT

CHAPTER 3

DOES THIS REGULATION APPLY TO ME?

APPLICABILITY OF THE REGULATION

The shipbuilding NESHAP is applicable to any major source of HAP emissions using more than 1,000 liters of marine coatings annually. The actual and potential emissions of HAP materials from most shipyards are substantially less than the major source cutoff limits [i.e., 9.1 Mg/yr (10 tons/yr) of any single HAP, or 22.8 Mg/yr (25 tons/yr) of all HAP combined]. To determine the applicability of this regulation to your facility, you must determine whether the plant site as a whole is a major source. A formal HAP emissions inventory should be used to determine if total potential HAP emissions from all HAP emission sources at the plant site meets the definition of a major source. This inventory should include all activities resulting in HAP emissions (whether shipbuilding/repair related or not).

Existing major sources may switch to "synthetic area source" status by obtaining and complying with an enforceable limit on their potential to emit prior to the "compliance date" of the regulation. The "compliance date" for this regulation is December 16, 1997. New major sources are required to comply with the NESHAP requirements upon start up or the promulgation date, whichever is later. If your facility with potential HAP emissions greater than the cutoff limit(s) has not obtained enforceable limits on its potential to emit by the compliance date, and has not complied with the NESHAP requirements, you will be in violation of the NESHAP. All sources that are major sources for HAP on the compliance date are required to comply permanently with the NESHAP to ensure that the maximum achievable reductions in toxic emissions are achieved and maintained.

Are there any small usage provisions? Any source having surface coating operations with less than 1,000 liters annual marine coating usage does not have to comply with the MACT standard. This provision gives relief to a source that qualifies as a major source because of activities other than shipbuilding/repair surface coating operations. However, the source is required to keep records of the volume of coating used in a year.

How many facilities are affected and where are they located? The EPA estimates that there are about 437 shipbuilding and ship repair facilities (i.e., shipyards) nationwide. Of the estimated 437 shipyards, 35 are estimated to be major sources of HAP emissions. Figure 3-1 and Table 3-1 show the approximate distribution of the facilities by State. Appendix C lists the known facilities that are believed to be affected by this regulation.

If a major source facility has several painting operations and only some of those operations exceed the minimum 1,000 liters annual marine coating usage, is the shipbuilding NESHAP applicable? The shipbuilding NESHAP is applicable to any major source of HAP (and all associated operations or process steps) that has total marine coating usage greater than the 1,000 liter cutoff. The cutoff was intended to minimize the recordkeeping and reporting burden for those facilities doing

Figure 3-1. 437 active U.S. shipbuilding facilities (August 1991).

TABLE 3-1. U.S. SHIPYARD LOCATIONS*

State	No. of shipyards
Louisiana	74
Texas	53
Virginia	34
California	33
Florida	33
Washington	25
New York	21
Mississippi	17
Alabama	15
Pennsylvania	12
Oregon	10
Wisconsin	9
Massachusetts	8
Maine	7
New Jersey	7
Ohio	7
Indiana	6
Illinois	6
North Carolina	6
South Carolina	6
Michigan	6
Rhode Island	6
Tennessee	6
Missouri	5
Hawaii	5
Georgia	4
Maryland	4
Puerto Rico	3
Alaska	2
Arkansas	2
Connecticut	2
Minnesota	1
Oklahoma	1
New Hampshire	1
TOTAL	437

*This summary data was collected July/August 1991.

minimal or touch-up painting with marine coatings.

If a ship is docked in a major source facility, are any painting activities conducted by the ship's crew covered by the regulation? All activities conducted within the boundaries of the shipyard must be accounted for, are subject to the requirements of the regulation, and are the responsibility of the shipyard owner/operator. When the Agency collected coatings and solvent usage information from the industry, there was no differentiation made regarding who was applying the various coatings and/or solvents.

What about shipyard painting operations or activities that are conducted away from the actual land-based facilities (i.e., downstream or "down the river")? Some determination would have to be made regarding how far into the water the shipyard's boundaries extend. As initial guidance on this issue, we would recommend that such activities be considered the same as other painting activities and subject to the same requirements.

If a shipyard company uses (leases) facilities owned by the State or Port Authority, who is responsible for determining applicability? The owner or operator of the "affected source" should conduct an emissions inventory to determine major source status based on aggregate air emissions of all HAP material. If it is determined that the facility is a major source, any details involving compliance demonstration and/or reporting would have to be worked with the appropriate enforcement agency.

RULE OF THUMB - RED FLAG ALERTS

If a shipyard answers yes to one or more of the following questions it would suggest that a more in-depth review would be appropriate to determine if the facility is subject to the NESHAP.

1. Did your shipyard use in the last year or does it anticipate using in the current year 75,000 or more liters of paints and solvents?

2. Did your shipyard paint in the last year, or does it anticipate painting in the current year 10 or more ships?

3. Did your shipyard paint in the last year or does it anticipate painting in the current year more than 140,000 sq.meters of ship or vessel surfaces?

4. Did your shipyard's estimating department allocate for its paint shops during the last year or does it anticipate allocating in the current year more than 6000 manhours of painting?

5. Did your shipyard generate and list on a hazardous waste manifest form in the last year more than 15,000 liters of waste solvent?

CHAPTER 4

WHAT DO I NEED TO DO TO COMPLY?

OVERVIEW

The following four principles should be followed to comply with all requirements of the regulation:

1. Buy/Use only compliant coatings;
2. Do not thin any coating beyond the associated maximum allowable thinning ratio;
3. Use good work practices when handling or transferring coatings, solvents, and/or resulting wastes; and
4. Follow all recordkeeping and reporting requirements.

COATING COMPLIANCE OPTIONS

Because different shipyards track coating and solvent usage in various ways, four compliance options were developed and included in the regulation. Shipyards can choose one or more (and any combination of) compliance options to demonstrate compliance in their monthly records and semiannual compliance report. Options 1-3 are based on VOC being used as a surrogate for VOHAP.

- Option 1: *Coatings to which thinning solvent will not be added*--If you never thin coating prior to application, you will probably want to choose option 1, which is the most straightforward and least burdensome in terms of recordkeeping and reporting requirements. Compliance is determined on a coating-by-coating basis.
- Option 2: *Coatings to which thinning solvent will be added - coating-by-coating compliance*--Should be used when coatings are thinned and you want to determine compliance on a coating-by-coating basis.
- Option 3: *Coatings to which the same thinning solvent will be added - group compliance* --Similar to Option 2, with the exception that compliance is demonstrated for a group of coatings that are "grouped" by thinner type.
- Option 4: *Demonstration of compliance through an alternative test method*--Involves demonstration of compliance using an alternative test method that measures VOHAP content of a coating rather than VOC content as in options 1 through 3. Similar/parallel options to those under 1 through 3 are implied under option 4. (See Figure 4-1.)

Additional detail on these options is provided in Chapter 5.

Is averaging allowed? No. For purposes of complying with the NESHAP, no marine coating with a VOHAP content exceeding the applicable limit in Table 2-1 can be applied. The issue of averaging was considered during the development of the NESHAP, and average limits were proposed to industry representatives as part of the regulatory alternatives evaluated prior to proposal. (The average limits were significantly lower than the maximum never-to-be-exceeded limits.) Industry, as represented by those participants in the meetings held with

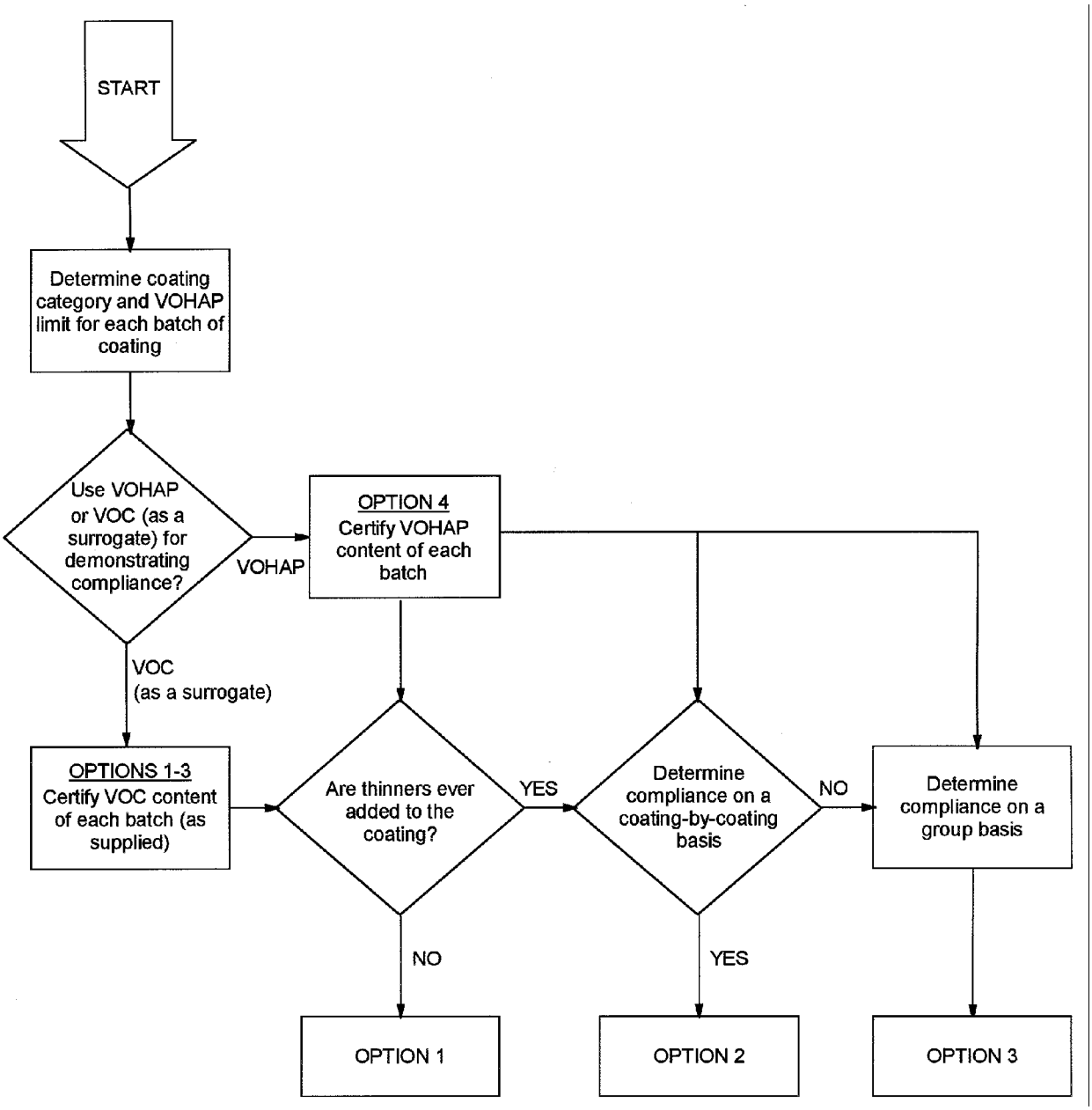

Figure 4-1. Compliance options.

EPA, did not want average limits because of the additional recordkeeping burden and the fact that most existing State regulations utilize the same type of maximum never-to-be-exceeded limits for marine coatings.

It is important to note that a type of averaging is allowed for certain recordkeeping and reporting purposes (compliance option 3). This "averaging" of recordkeeping/reporting data associated with coatings grouped together by the type of thinning solvent is only meant to provide flexibility to shipyards and hopefully reduce the paperwork burden (i.e., labor hours) needed to compile monthly records. This approach will be beneficial to any facility doing minimal thinning or using one or two particular thinners for all of their marine coatings.

The limits for this regulation are set in terms of grams of VOHAP per liter of solids (g/L) and are "never to be exceeded." What does this mean from a compliance perspective? The regulation requires that each and every container of "as applied" coating must comply with the applicable maximum or "never to be exceeded" VOHAP content limit. Averaging of compliant and noncompliant paints is not allowed. The semi-annual compliance reports can be completed using units of g VOHAP/L of solids or g VOHAP/L of coating for shipyards using compliance option 1. The NESHAP provides this flexibility to allow shipyards to report coating compliance in those terms with which they are most familiar or comfortable. However, the solids (nonvolatiles) based units are to be used with compliance options 2, 3, and 4 and in resolving any "equivalency" questions.

What if I want to use a different control technique? You may use another control technique, as long as you meet and can demonstrate an equivalent emission reduction for your facility. You will need EPA approval to choose another technique, as well as get EPA approval on the monitoring parameters or alternative test methods that you will use.

WORK PRACTICES

Besides complying with the VOHAP emission limits discussed in the above compliance options, you will also be required to meet work practice standards. The procedures, equipment, training, etc., to meet work practice standards are to be identified and explained in your implementation plan. Also, the procedures to be used for documenting (record and report compliance) that the work practice standards are being met have to be described in your implementation plan as well. Examples of specific work practice standards are included as part of the example implementation plan in Appendix E.

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CHAPTER 5

HOW WILL I DEMONSTRATE COMPLIANCE?

Once you have selected which compliance option(s) you intend to use (documented in your implementation plan), you have until the 15th day of each calendar month to compile the required information to demonstrate compliance for the previous month. Figure 5-1

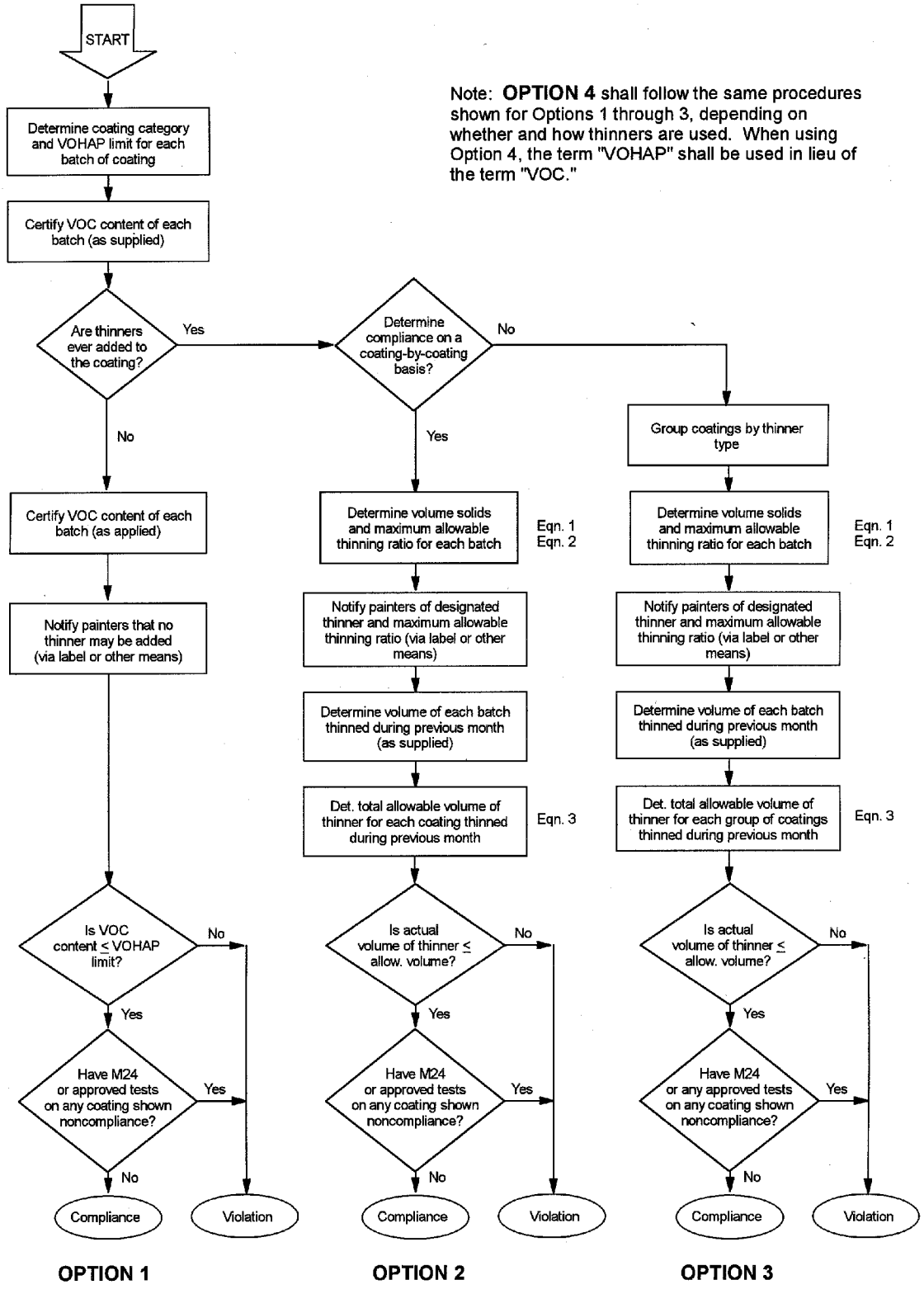

Figure 5-1. Flow diagram of compliance procedures.

provides a flow diagram of all four compliance procedures and Table 5-1

TABLE 5-1. STEP-BY-STEP COMPLIANCE OPTIONS

Step 1.0	Do you want to demonstrate compliance using VOC data (Options 1, 2, and 3) or VOHAP data (Option 4)?
Step 2.0	Set up a coatings and thinning solvent database: determine coating category, VOHAP limit, and VOC/VOHAP content of each batch of coating and thinning solvent (as supplied).
Step 3.0	Depending on whether or not and how thinning solvents are added to a specific coating or group of coatings, select compliance options 1, 2, or 3.
	OPTION 1
Step 4.1	Certify VOC/VOHAP content of each batch of coating (as applied).
Step 5.1	Notify painters that no thinning solvent may be added to the coating and maintain a sample of the documentation.
Step 6.1	Document in monthly records that the VOC/VOHAP content of each coating is less than or equal to the applicable VOHAP limit. (Compliance is thereby demonstrated.)
	OPTION 2
Step 4.2	Determine volume solids (nonvolatiles) and maximum allowable thinning ratio for each batch of coating (using Equations 1 and 2, if necessary).
Step 5.2	Notify painters of designated thinning solvent that may be added and the maximum allowable thinning ratio and maintain a sample of the documentation.
Step 6.2	Determine the "as supplied" amount (volume) of each batch of coating that was thinned during the previous month.
Step 7.2	Determine the total allowable amount (volume) of thinning solvent for each coating thinned during the previous month using Equation 3.
Step 8.2	Document in monthly records that the volume of actual thinner added to each batch of coating is less than or equal to the allowable volume. (Compliance is thereby demonstrated.)
	OPTION 3
Step 4.3	Group coatings by thinner type (e.g., all coatings thinned with the same thinning solvent).
Step 5.3	Determine volume nonvolatiles (solids) and maximum allowable thinning ratio for each batch of coating (using Equations 1 and 2, if necessary).
Step 6.3	Notify painters of designated thinning solvent that may be added and the maximum allowable thinning ratio and maintain a sample of the documentation.
Step 7.3	Determine the "as supplied" amount (volume) of each batch of coating that was thinned during the previous month.
Step 8.3	Determine the total allowable amount (volume) of thinning solvent for each group of coatings thinned during the previous month using Equation 3.
Step 9.3	Document in monthly records that the volume of actual thinner added to the group of coatings is less than or equal to the allowable volume. (Compliance is thereby demonstrated.)

gives step-by-step instructions for demonstrating compliance using each of the compliance options. The required information varies slightly, depending on the selected compliance option, but generally involves certifying the total amount of each type (i.e., category) of coating applied during the month compiled with the applicable VOHAP limit in Table 2-1.

The "certification" of each coating is the key to demonstrating compliance. Figure 5-2

VOC DATA SHEET:[1]

PROPERTIES OF THE COATING "AS SUPPLIED" BY THE MANUFACTURER[2]

Coating Manufacturer:_____

Coating Identification:_____

Batch Identification:_____

Supplied To:_____

Properties of the coating as supplied[2] to the customer:

A. Coating Density: $(D_c)_s$ _____ g/L

G ASTM D1475-90 **G** Other[3]

B. Total Volatiles: $(m_v)_s$ _____ Mass Percent

G ASTM D2369-93 **G** Other[3]

C. Water Content:

1. $(m_w)_s$ _____ Mass Percent

G ASTM D3792-91 **G** ASTM D4017-90 **G** Other[3]

2. $(v_w)_s$ _____ Volume Percent

G Calculated **G** Other[3]

D. Organic Volatiles: $(m_o)_s$ _____ Mass Percent

E. Nonvolatiles: $(v_n)_s$ _____ Volume Percent

G Calculated **G** Other[3]

F.[4] VOC Content $(VOC)_s$:

1. _____ g/L solids (nonvolatiles)

2. _____ g/L coating (less water and exempt compounds)

G. Thinner Density: D_{th} _____ g/L

ASTM _____ **G** Other[3]

Remarks: (use reverse side)

Signed:_____ Date:_____

[1]Adapted from EPA-340/1-86-016 (July 1986), p. II-2.
[2]The subscript "s" denotes each value is for the coating "as supplied" by the manufacturer.
[3]Explain the other method used under "Remarks."
[4]Include mass of HAP "exempt" compounds.

Figure 5-2. VOC Data Sheet.

VOHAP DATA SHEET:[1]

PROPERTIES OF THE COATING "AS SUPPLIED" BY THE MANUFACTURER[2]

Coating Manufacturer:_____

Coating Identification:_____

Batch Identification:_____

Supplied To:_____

Properties of the coating as supplied[2] to the customer:

A. Coating Density: $(D_c)_s$ _____ g/L

G ASTM D1475-90 **G** Other[3]

B. Total Volatiles: $(m_v)_s$ _____ Mass Percent

G ASTM D2369-93 **G** Other[3]

C. Water Content:

1. $(m_w)_s$ _____ Mass Percent

G ASTM D3792-91 **G** ASTM D4017-90 **G** Other[3]

2. $(v_w)_s$ _____ Volume Percent

G Calculated **G** Other[3]

D. HAP Volatiles: $(m_{HAP})_s$ _____ Mass Percent

E. Nonvolatiles: $(v_n)_s$ _____ Volume Percent

G Calculated **G** Other[3]

F. VOHAP Content $(VOHAP)_s$:

1. _____ g/L solids (nonvolatiles)

2. _____ g/L coating (less water and exempt compounds)

G. Thinner VOHAP Density: $D_{th(VOHAP)}$ _____ g/L

ASTM _____ **G** Other[3]

Remarks: (use reverse side)

Signed:_____ Date:_____

[1]Adapted from EPA-340/1-86-016 (July 1986), p. II-2.
[2]The subscript "s" denotes each value is for the coating "as supplied" by the manufacturer.
[3]Explain the other method used under "Remarks."

Figure 5-3. VOHAP Data Sheet.

can be used for certifying the VOC content of a specific coating, and Figure 5-3 can be used for certifying the VOHAP content of a specific coating. Other forms may be used to certify either the VOC or VOHAP content of a marine coating (see examples in Appendix E) and it should be noted that the majority of the work associated with the certification and compliance demonstration needs to be done once the coatings are ordered or received by the shipyard. Many of the coatings will be used repeatedly and having a good database of coating compliance certification information will greatly simplify the monthly compliance burden.

If thinning solvents are sometimes or routinely added to coatings prior to application, there are equations to be used

(see § 3.785(c)(2)) to calculate the maximum allowable thinning ratio and the total allowable volume of thinner. Once again, you can save yourself a lot of time by collecting the relevant coating and solvent data prior to the actual application in the field. Similar provisions are included for cold weather (temperatures < 4.5 EC) conditions, as well as separate VOHAP limits (see Table 2-1).

The source has an existing inventory of paints that may exceed the NESHAP limits. Can the source finish its inventory after the compliance date? Can the source enter into consent orders or have a grace period to use it up? The other alternative would be to dispose of it as hazardous waste. In light of the recent direct final regulation (June 18, 1996), which extended the compliance date from December 16, 1996 to December 16, 1997, the EPA believes there should be no reason to have noncompliant coatings in inventory at any shipyard on the new compliance date. Industry representatives and trade associations have worked with the EPA for the past 5 years in developing the NESHAP and the CTG and are well aware of the limits. The coating manufacturers and the National Paint and Coatings Association (NPCA) are similarly informed.

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CHAPTER 6

WHAT RECORDKEEPING AND REPORTING WILL I NEED TO DO?

RECORDKEEPING

This regulation requires that you keep records to document your compliance status with the regulation. It is recommended that someone at each facility be identified to maintain all NESHAP compliance recordkeeping information as required for each option used during the reporting periods. These records must be maintained for 5 years. Many, but not all, recordkeeping items are reported. The recordkeeping requirements are summarized in Table 2-2.

REPORTING

You must submit all reports to the Administrator before the 60th day following completion of each 6-month period after the compliance date. The "Administrator" is the appropriate Regional Office of the U. S. Environmental Protection Agency (as listed in Table 10-1 of this guidebook) or the delegated State or local authority. You may contact the appropriate EPA Regional Office to identify those State or local agencies with delegated authority. The required reports may be sent by U.S. Mail, fax, or by another courier (including electronic submission). The reporting requirements are summarized in Table 2-2. For existing sources, the first six month compliance period ends June 16, 1998, and the associated compliance report is due August 16, 1998.

RECORDKEEPING AND REPORTING REQUIREMENTS

For both recordkeeping and reporting, specific requirements vary according to which particular compliance option you choose. (These compliance options are detailed in Chapter 4.) Regardless of which option you choose, you must record and, in most cases, report the following items:

- **Initial notifications**

  If your source had an initial start-up date before December 15, 1996, (this would include all affected existing facilities), you should have submitted an initial notification by June 15, 1996. Any new source (with an initial start-up date on or after December 15, 1996) must submit an initial notification 6 months prior to start-up. (See Appendix D.)

- **Implementation Plan**

  Existing sources must submit an implementation plan by December 16, 1996. A sample implementation plan is included as Appendix E. The sample implementation plan is only an example; you can use any format as long as your implementation plan provides the following information:

(1) Coating Compliance Procedures

(2) Recordkeeping Procedures. You must include the procedures for maintaining all required records, including the procedures for gathering necessary data and making calculations

(3) Transfer, Handling, and Storage Procedures. You must include the procedures for ensuring compliance with the requirements of the regulation as discussed in Chapter 5

- **Monthly records**

(1) Volume of each low-usage-exempt coating applied (by month)

(2) Identification of the coatings used, their EPA categories, and VOHAP limits

(3) Results of Method 24 or other approved measurements on individual containers

(4) Certification of as-supplied VOC content for each batch of coating* (See examples in Appendix F)

Additional recordkeeping and reporting requirements depend on your facility's specific compliance procedures. (These procedures are described in Chapter 5 of this guidebook.) The following discussion presents these requirements according to the specific compliance procedures.

Option 1 - No Thinning Solvents Added

If your facility does not add any thinning solvents to coatings, you may opt to use option 1. If you choose this option, you must record the following information:

*Must be recorded, but not reported.

- Certification of the as-applied VOC content of each batch of coating (which is the same as the as-supplied VOC content)
- The volume of each coating applied*
- Compliance violations, if applicable

Option 2 - Coating-By-Coating Compliance

If you choose this type of compliance, you must record the following information for each coating for each month:

- Designated thinner for the coating and its density
- Volume fraction of solids (nonvolatiles) for each batch of the coating, including calculations *
- Maximum allowable thinning ratio for each batch of the coating, including calculations *
- Cold weather dates and times, below 4.5EC (if cold weather VOHAP content limits are used) *
- Volume of each batch of the coating applied *
- Total allowable volume of thinner, including calculations *
- Actual volume of thinner used
- Compliance violations, if applicable

Option 3 - Group Compliance

If you choose this type of compliance, you must record the following information:

- Designated thinner for the group of coatings and its density
- Mass fraction and volume fraction of solids (nonvolatiles) for each batch of each coating in the group, including calculations *
- Maximum allowable thinner ratio for each batch, including calculations *
- Cold weather dates and times, below 4.5EC *
- Identification of coating groups and thinners *
- Volume applied of each batch of each coating in the group *
- Total allowable volume of thinner, including calculations *
- Actual volume of thinner used*
- Compliance violations, if applicable

Option 4 - Alternative Test Method

Compliance may be demonstrated through an alternative (i.e., other than EPA Method 24) test method. If you choose an alternative test method where compliance is based on actual VOHAP content, rather than the VOC surrogate used under Options 1-3, you must record and report the Administrator-approved VOHAP test method or certification procedure. The other recordkeeping and reporting requirements are identical to those of Options 1, 2, or 3, depending on if and how thinners are used.

Method 311 - Analysis of Hazardous Air Pollutant Compounds in Paints and Coatings by Direct Injection into a Gas Chromatograph was developed by EPA as a result of the Wood Furniture (Surface Coating) NESHAP. However, any alternative test method must meet the specified accuracy limits for sensitivity, duplicates, repeatability, and reproducibility coefficient of variation described in Section 63.786 Test methods and Procedures of the final regulation (see Appendix A).

(Note: When using Option 4, the term "VOHAP" should be used instead of the term "VOC" since compliance is to be demonstrated using actual VOHAP content--see Figure 5-1 and Table 5-1.)

What if a violation in the standard occurs?

If you detect a violation of the standards, you must record additional information for the remainder of the reporting period during which the violation occurred. Your violation may be covered by a Federally-approved exemption (e.g., a promulgated exemption from an emission limitation or standard published in the Federal Register). If it is, you must report the following information:

- A summary of the number and duration of the violations, classified by reason
- A summary of the number and total duration of incidents in which the monitoring procedures did not operate smoothly or produced data that was inaccurate, classified by reason.
- The compliance status on the last day of the reporting period and information on whether compliance was continuous or interrupted during the reporting period.

For other violations, a federally-approved exemption may not apply to the violation. In these instances, you must report the following information:

- The magnitude of each violation
- The reason for each violation
- A description of the corrective action taken for each violation, which should include actions taken to minimize each violation and the action taken to prevent reoccurrences
- All quality assurance activities performed on any monitoring procedures.

There has been some confusion regarding the initial notification and the implementation plan for complying with the shipbuilding NESHAP. When are they due? When the final regulation was published in the Federal Register on December 15, 1995 (see Appendix A), both the initial notification and implementation plan were to be submitted by June 15, 1996. However, the direct final regulation published on June 18, 1996 in the Federal Register extended the due date for submitting your implementation plan until December 16, 1996, and extended the compliance date to December 16, 1997. It was EPA's intent to only extend the due date for submitting the implementation plan and extend the compliance date. Initial notifications were never an issue and were due June 13, 1996.

CHAPTER 7

WHAT ARE MY POLLUTION PREVENTION OPTIONS?

What is Pollution Prevention? As stated in the Pollution Prevention Act of 1990, Congress has declared it to be the nation's policy that, wherever feasible, pollution should be prevented or reduced at the source. The Act states that source reduction is more desirable than waste management and pollution control. Source reduction is defined as any practice that reduces the amount of any hazardous substance entering the waste stream or otherwise released into the environment (from a process) prior to recycling, treatment, or disposal. Therefore, you must also consider wastewater, hazardous waste, and solid waste effects and regulations as well as air pollutant emissions in selecting any method of control.

What are my options? This regulation allows for pollution prevention measures to be used when complying with the requirements of the regulation. The entire regulation focuses on pollution prevention in that the marine coating limits are based on switching to lower VOC/VOHAP coatings (alternatives are allowed, but require special approval) and the work practice standards are intended to reduce evaporative losses and prevent spills and accidental emissions.

There are several potential pollution prevention options for the shipbuilding and ship repair industry, many of which can be included as work practice standards in the facility-specific implementation plan.

These options include:

- More efficient application equipment
- Extensive operator training
- Reformulated marine coatings
- Recycling of cleaning solvents
- Alternative cleaning materials
- Containment around storage areas for VOC/VOHAP-containing materials

Other pollution prevention measures include (1) carefully handling and transferring all VOC/ VOHAP containing materials to and from containers, tanks, vats, vessels, and piping systems so that spills are minimized and (2) closing all thinning solvent and waste containers that hold any VOC/VOHAP unless adding or removing materials from them.

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CHAPTER 8

HOW DOES THIS REGULATION RELATE TO OTHER FEDERAL AND STATE OR LOCAL REQUIREMENTS?

PERMITTING

Will I need a State operating permit?

Yes. Under title V, all major sources are required to obtain permits--no deferrals or exemptions are allowed for these major sources.

Title V operating permit program background. Title V of the CAA as amended in 1990 requires the establishment of State-implemented operating permits programs with Federal oversight. Prior to the 1990 amendments, sources were not required by Federal law to obtain operating permits for sources of air pollution emissions. However, many States issued their own operating permits to certain sources. You may have been required to obtain an operating permit for your facility under a State permit program in the past. Now, all major sources are required to obtain a title V operating permit.

Permit requirements in general. The operating permit program will incorporate all applicable Federal CAA regulation requirements and any State or local government requirements. Therefore, permit requirements will be at least as stringent as requirements mandated by the Federal CAA regulations (e.g., the shipbuilding and ship repair NESHAP).

The basic format of operating permits is detailed (codified) in part 70 of title 40 of the *Code of Federal Regulations* (40 CFR part 70). Owners or operators of facilities subject to Federal CAA regulations will have to:

- submit a permit application;
- submit compliance plans and schedules;
- comply with all applicable air emission limits and standards listed in the permit (e.g., the shipbuilding and ship repair NESHAP);
- conduct monitoring (if required), submit monitoring reports, and make semi-annual certifications of the source's compliance status;
- submit applications for any permit modifications;
- submit applications for permit renewals every 5 years; and
- pay a permit or emission fee.

Does my State have a permitting program? All States must develop a title V operating permits program. States were required to submit their permitting programs to EPA for approval by November 15, 1993. One year later, the EPA was to have approved the States' permitting programs and authorized the States to administer their programs. As of July 1996, approvals have been published in the Federal Register for 42 State and 56 local programs; additionally, EPA has proposed to approve another 4 State agency programs and 3 local agency programs. The EPA's Technology Transfer Network (TTN), an electronic bulletin board system, has the latest status of permit program submittals and approvals. (See Chapter 10 for instructions on how to access the TTN.) You may also contact your State or local air pollution control agency

for more information on the status of your State's title V operating permit program.

When do I apply for my operating permit? Your deadline for submitting a title V operating permit application will depend on when your State or local title V permitting program is approved by the EPA. In general, your application will be due within 12 months after the title V program approval date. However, some State and local permitting authorities have shorter deadlines. Once you have your operating permit, it must be renewed or updated at least every 5 years.

EPA's GENERAL PROVISIONS

On March 16, 1994, EPA published the General Provisions for all regulations codified in part 63 (i.e., all NESHAP) of the Code of Federal Regulations (CFR). These General Provisions were published in the Federal Register in volume 59, beginning on page 12408. When a source becomes subject to a regulation in part 63, it automatically is subject to the General Provisions as well. However, individual regulations in part 63 may override part or all of the General Provisions. In the case of this regulation, EPA has overridden some of the requirements of the General Provisions. Table 1 of the shipbuilding regulation (located on page 64344 of the Federal Register text, see Appendix A) explains in detail which sections apply and which sections are overridden.

STATE OR LOCAL MARINE COATING REGULATIONS

State or local requirements that may have affected you prior to the new Federal regulation for shipbuilding and ship repair continue to apply. The new Federal regulation is the minimum emission control that is required nationally. Some State and local agencies do require stricter limits. If the current State or local standard is less stringent than the Federal regulation, the Federal regulation must be met.

The format of State or local standards may be different also. For example, the California Air Resources Board (CARB), the various air quality management districts in California, and the State of Louisiana have marine coating limits expressed in terms of mass (g) of VOC per volume (L) of coating less water and exempt compounds. State regulations typically relate to VOC rather than VOHAP. Accordingly, State rules may have shorter compliance periods (e.g., daily rather than monthly). The NESHAP was based primarily

In addition to air pollution regulations, shipyard surface coating operations may also be subject to wastewater and solid waste disposal regulations. Contact your State or local permitting authority for more information.

CHAPTER 9

HOW MUCH WILL IT COST?

OVERVIEW

The cost of complying with the regulation will typically involve additional material (coatings) and recordkeeping and reporting costs. As summarized in Chapters 4 and 5, you only have to use compliant coatings (which are readily available in today's market) and good work practices to comply with the regulation. Compliant coatings may be more expensive than the conventional coatings they replace. In addition, demonstrating compliance to the appropriate enforcement official will involve more paperwork and labor to complete that paperwork. Many of the larger (i.e., Tier I) shipyards have tracking systems currently in place that will only have to be modified slightly or not at all. Shipyards located in states such as California and Louisiana that have been complying with similar requirements for several years should have minimal cost impacts as well.

In developing cost impacts of the regulation, EPA used model plants to analyze separate costs. Table 9-1 summarizes the costs for each size and type of model shipyard. These results represent the original shipyard costs to comply and were calculated as the difference between before (baseline) and after NESHAP costs. The average shipyard was projected to spend $58,000/yr to comply with the regulation.

MATERIAL (COATING) COSTS

The net cost associated with switching to lower-VOHAP coatings was assumed to be the sum of the additional cost of compliant coatings, the savings associated with higher solids content, the savings associated with decreased thinner usage. Costs were developed for "baseline" (all coatings being used currently) and for those coatings meeting the VOHAP limits in Table 2-1. The difference between the use of baseline and compliant coatings is presented in Table 9-1.

For the impact analysis, it was assumed that the total build of a lower-VOHAP coating (the dry film thickness) would equal that of the conventional counterpart, i.e., the total amount of solids (nonvolatiles) applied would remain constant. Because lower-VOHAP solvent-borne coatings contain more nonvolatiles (solids), the total volume of paint needed to coat a given area is less than for the conventional, lower-solids coatings (assuming constant transfer efficiency). The lower-VOHAP coatings, however, are more expensive on a dollar-per-unit volume basis.

In evaluating the use of lower-VOHAP solvent-borne coatings, it was assumed that lower-VOHAP coatings require the same amount of thinning solvent, liter for liter, as conventional coatings. Because fewer liters of lower-VOHAP coatings are required (as a result of their higher solids content), thinner use would decrease. A decrease in the amount of thinner used results in VOHAP emission reductions and a cost savings.

RECORDKEEPING AND REPORTING

Recordkeeping and reporting (R&R) practices are established by permit conditions, and in some instances, the requirements of section 313 of the Superfund Amendments and Reauthorization Act of 1986 (SARA 313). For that reason, the cost of recordkeeping to comply with permit and SARA 313 requirements are considered as the baseline from which to measure the incremental cost of this regulation. Complying with the NESHAP will require more involved recordkeeping practices than those necessary at the baseline.

Recordkeeping and reporting costs are a function of the equipment and labor required. A computer (and software) will probably be used. Labor requirements include training, data recording and analysis, and report preparation.

Most large and medium shipyards already maintain records to comply with State or local permits as well as SARA 313 requirements. It has been assumed that the operations at these facilities are complex enough and the facilities sophisticated enough that they already use a computerized system for R&R.

The current reporting requirements for large and medium yards (at baseline) are assumed to consist of an annual SARA 313 report and an annual report of VOC emissions. To prepare these reports, it is assumed that the facilities have adapted their central inventory tracking system to record the quantity of each paint and thinner used at the yard. It is also assumed that this information is coupled with a data base in which the HAP and VOC contents of each paint and thinner are stored. The total technical labor devoted to recordkeeping and reporting for large and medium yards prior to promulgation of the NESHAP is estimated to be 159 hours per years (hr/yr). To comply with the NESHAP it was assumed that no additional equipment is required for any affected facility.

Most of the additional costs associated with the NESHAP will result from the higher costs of compliant coatings compared to those being used currently. The recordkeeping and reporting burden only accounts for approximately 25 percent of the total costs.

TOTAL COSTS

Table 9-1 summarizes the total industry annual costs resulting from implementing the NESHAP, which were estimated to be about $2.0 million. The average facility cost to comply with the final regulation is estimated to be $58,000/yr. These estimates presume that all incremental environmental costs are imposed as a consequence of implementing MACT. In fact, those shipyards located in nonattainment areas (which is thought to include most of the 35) will likely be required to bear essentially the same costs to meet State requirements for limiting VOC emissions as the States impose rules based on EPA's recommendations on best available control measures (BACM) for control of VOC.

PERMITTING FEES

As discussed in Chapter 8, you may be required by the regulation to obtain an operating permit under title V of the CAA. If so, you will be charged a permit or emission fee by your State or local permitting authority when you apply for your title V permit. This fee will vary from State to State. For more information on title V operating permit fees, contact your State or local permitting authority or the EPA Regional Office for your State.

TABLE 9-1. ESTIMATED COSTS FOR COMPLYING WITH NESHAP, $/YR[a]

	Model Yards			
	Construction		Repair	
	Medium	Large	Medium	Large
Average total coating usage, L/yr (gal/yr)	158,726 (41,931)	510,560 (134,876)	131,228 (34,667)	453,718 (119,860)
Average total solvent usage, L/yr (gal/yr)	43,532 (11,500)	162,132 (42,831)	20,562 (5,432)	23,091 (6,100)
Additional (net) material - coating and solvent costs, $/yr	40,217	124,783	12,306	43,448
Recordkeeping and reporting costs (above baseline level), $/yr	9,825	32,627	9,825	32,627
Total additional costs, $/yr	50,042	157,410	22,131	76,075
Estimated number of affected facilities	8	6	17	4
Total costs, $/yr	400,336	944,460	376,227	304,300
Total industry costs = $2,025,323				
Average facility costs = $57,866				

[a]Based on 1992 dollars.

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CHAPTER 10

WHERE CAN I GO FOR MORE INFORMATION AND ASSISTANCE?

TELEPHONE CONTACTS

For more information on how to comply with this regulation, please call:

- your State or local air pollution control agency;
- your local, regional, or national trade association;
- your State Small Business Assistance Program; or
- your State Small Business Ombudsman.

For information on your State Small Business Assistance Program contacts, call EPA's Control Technology Center Hotline at (919) 541-0800.

Also, for more information, you may call the EPA Regional Office that serves your State or territory. Table 10-1 lists the telephone numbers of the 10 EPA Regional Offices and the States and territories that they serve.

EPA's ELECTRONIC BULLETIN BOARD SYSTEM

The EPA operates an electronic bulletin board, the *Technology Transfer Network* or *"TTN,"* which contains copies of preambles and regulations, background information documents, policy memoranda, and other guidance materials. You may access the TTN via modem by dialing (919) 541-5742 or the Internet at http:\\ttnwww.rtpnc.epa.gov. Assistance with the TTN is available by calling (919) 541-5384.

OTHER EPA GUIDANCE MATERIALS

In developing this regulation, EPA has prepared other materials that provide more information on the technical aspects of the regulation. These include:

- *Surface Coating Operations at Shipbuilding and Ship Repair Facilities--Background Information for Proposed Standards (Volume I)*.

  EPA-453/R-93-030a. February 1994.

- *National Emission Standards for Hazardous Air Pollutants for Shipbuilding and Ship Repair Facilities (Surface Coating)--Background Information for Final Standards*.

  EPA-453/R-95-016b. November 1995.

Copies of these reports are available through EPA's Library Services Office (MD-35), U. S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, (919) 541-2777; on EPA's TTN; or, for a fee, from the National Technical Information Services, 5285 Port Royal Road, Springfield, Virginia 22161, (703) 487-4600.

Also, EPA has developed an informational pamphlet which has summarized much of the general information contained in this guidebook. A copy of the pamphlet may be obtained by contacting Dr. Mohamed Serageldin of EPA's Emission Standards Division, Research Triangle Park, North Carolina. His telephone, fax, and email are (919) 541-2379, (919) 541-5689, and serageldin.mohamed@epamail.epa.gov, respectively. You may also contact

Ms. Suzanne Childress of EPA's Office of Enforcement and Compliance Assurance (OECA), Mail Station 2223-A, 401 M Street, S.W., Washington, D.C. 20460. Her telephone and fax numbers are (202) 564-7018 and (202) 564-7018, respectively.

TABLE 10-1. EPA REGIONAL OFFICE CONTACTS

Region	Telephone #	States covered	Address
1	(617) 565-3728	CT, ME, MA, NH, RI & VT	Director, Air, Pesticides and Toxics Division J.F.K. Federal Building Boston, MA 02203-2211
2	(212) 637-4023	NJ, NY, Puerto Rico & Virgin Islands	Director, Air and Waste Management Division 290 Broadway 21st Floor New York, NY 10007-1866
3	(215) 597-3237	DE, MD, PA, VA, WV & District of Columbia	Director, Air, Radiation and Toxics Division 841 Chestnut Street Philadelphia, PA 19107
4	(404) 347-2864	AL, FL, GA, KY, MS, NC, SC & TN	Director, Air, Pesticides and Toxics Management Division 345 Courtland Street, NE Atlanta, GA 30365
5	(312) 886-6793	IL, IN, MI, WI, MN & OH	Director, Air and Radiation Division 77 West Jackson Blvd. Chicago, IL 60604-3507
6	(214) 665-7225	AR, LA, NM, OK & TX	Director, Air, Pesticides and Toxics 1445 Ross Avenue Dallas, TX 75202-2733
7	(913) 551-7556	IA, KS, MO & NE	Director, Air RCRA and Toxics Division 726 Minnesota Avenue Kansas City, KS 66101
8	(303) 293-1886	CO, MT, ND, SD, UT & WY	Director, Air and Toxics Division 999 18th Street 1 Denver Place, Suite 500 Denver, CO 80202-2405
9	(415) 744-1143	AZ, CA, HI, NV, American Samoa & Guam	Director, Air and Toxics Division 75 Hawthorne Street San Francisco, CA 94105
10	(206) 553-1949	AK, ID, WA & OR	Director, Air and Toxics Division 1200 Sixth Avenue Seattle, WA 98101

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APPENDIX A

FEDERAL REGISTER NOTICE:
FINAL RULE AND DIRECT FINAL RULE

APPENDIX B

GLOSSARY OF TERMS

Terms used in the NESHAP and in this Guidebook are defined in the Clean Air Act (Act), or in this section as follows:

Add-on control system means an air pollution control device such as a carbon absorber or incinerator that reduces pollution in an air stream by destruction or removal prior to discharge to the atmosphere.

Affected source means any shipbuilding or ship repair facility having surface coating operations with a minimum 1,000 liters (L) (264 gallons [gal]) annual marine coating usage.

Air flask specialty coating means any special composition coating applied to interior surfaces of high pressure breathing air flasks to provide corrosion resistance and that is certified safe for use with breathing air supplies.

Antenna specialty coating means any coating applied to equipment through which electromagnetic signals must pass for reception or transmission.

Antifoulant specialty coating means any coating that is applied to the underwater portion of a vessel to prevent or reduce the attachment of biological organisms and that is registered with the EPA as a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act.

As applied means the condition of a coating at the time of application to the substrate, including any thinning solvent.

As supplied means the condition of a coating before any thinning, as sold and delivered by the coating manufacturer to the user.

Batch means the product of an individual production run of a coating manufacturer's process. (A batch may vary in composition from other batches of the same product.)

Bitumens mean black or brown materials that are soluble in carbon disulfide, which consist mainly of hydrocarbons.

Bituminous resin coating means any coating that incorporates bitumens as a principal component and is formulated primarily to be applied to a substrate or surface to resist ultraviolet radiation and/or water.

Certify

through analysis by Method 24 of appendix A to part 60 of title 40 of the Code of Federal Regulations (40 CFR 60) or through the use of forms and procedures outlined in Figure 5-2, or to attest to the VOHAP content as determined through an EPA approved test method. In the case of conflicting results, Method 24 of Appendix A to 40 CFR Part 60 shall take precedence over the forms and procedures outlined in Figure 5-2 for the options in which VOC is used as a surrogate for VOHAP.

Coating means any material that can be applied as a thin layer to a substrate and which cures to form a continuous solid film.

Cold-weather time period means any time during which the ambient temperature is below 4.5EC (40EF) and coating is to be applied.

Container of coating means the container from which the coating is applied, including but not limited to a bucket or pot.

Cure volatiles means reaction products that are emitted during the chemical reaction which takes place in some coating films at the cure temperature. These emissions are other than those from the solvents in the coating and may, in some cases, comprise a significant portion of total VOC and/or VOHAP emissions.

Epoxy means any thermoset coating formed by reaction of an epoxy resin (i.e., a resin containing a reactive epoxide with a curing agent).

Exempt compounds means specified organic compounds that are not considered VOC due to negligible photochemical reactivity. Exempt compounds are specified in 40 CFR §51.100(s).

Facility means all contiguous or adjoining property that is under common ownership or control, including properties that are separated only by a road or other public right-of-way.

General use coating means any coating that is not a specialty coating.

Hazardous air pollutant (HAP) means any air pollutant listed in or pursuant to Section 112(b) of the CAA.

Heat resistant specialty coating means any coating that during normal use must withstand a temperature of at least 204EC (400EF).

High-gloss specialty coating means any coating that achieves at least 85 percent reflectance on a 60 degree meter when tested by ASTM Method D-523.

High-temperature specialty coating means any coating that during normal use must withstand a temperature of at least 426EC (800EF).

Inorganic zinc (high-build) specialty coating means a coating that contains 960 grams per liter (8 pounds per gallon) or more elemental zinc incorporated into an inorganic silicate binder that is applied

to steel to provide galvanic corrosion resistance. (These coatings are typically applied at more than 2 mil dry film thickness.)

Major source means any source that emits or has the potential to emit in the aggregate 9.1 megagrams per year (10 tons per year) or more of any HAP or 22.7 megagrams per year (25 tons per year) or more of any combination of HAP.

Maximum allowable thinning ratio means the maximum volume of thinner that can be added per volume of coating without violating the applicable VOHAP limit (see Table 2-1).

Military exterior specialty coating or Chemical Agent Resistant Coatings ("CARC") means any exterior topcoat applied to military or U.S. Coast Guard vessels that are subject to specific chemical, biological, and radiological washdown requirements.

Mist specialty coating means any low viscosity, thin film, epoxy coating applied to an inorganic zinc primer that penetrates the porous zinc primer and allows the occluded air to escape through the paint film prior to curing.

Navigational aids specialty coating means any coating applied to Coast Guard buoys or other Coast Guard waterway markers when they are recoated aboard ship at their usage site and immediately returned to the water.

Nonskid specialty coating means any coating applied to the horizontal surfaces of a marine vessel for the specific purpose of providing slip resistance for personnel, vehicles, or aircraft.

Nonvolatiles (or volume solids) means substances that do not evaporate readily. This term refers to the film-forming material of a coating.

Normally closed means a container or piping system is closed unless an operator is actively engaged in adding or removing material.

Nuclear specialty coating means any protective coating used to seal porous surfaces such as steel (or concrete) that otherwise would be subject to intrusion by radioactive materials. These coatings must be resistant to long-term (service life) cumulative radiation exposure (ASTM D4082-83), relatively easy to decontaminate (ASTM D4256-83), and resistant to various chemicals to which the coatings are likely to be exposed (ASTM 3912-80). [For nuclear coatings, see the general protective requirements outlined by the U.S. Atomic Energy Commission in a report entitled “U.S Atomic Energy Commission Regulatory Guide 1.54" dated June 1973, available through the Government Printing Office at (202) 512-2249 as document number A74062-00001.]

Operating parameter value means a minimum or maximum value established for a control device or process parameter that, if achieved by itself or in combination with one or more other operating

parameter values, determines that an owner or operator has complied with an applicable emission limitation or standard.

Organic zinc specialty coating means any coating derived from zinc dust incorporated into an organic binder that contains more than 960 grams of elemental zinc per liter (8 pounds per gallon) of coating, as applied, and that is used for the expressed purpose of corrosion protection.

Pleasure craft means any marine or fresh-water vessel used by individuals for noncommercial, nonmilitary, and recreational purposes that is less than 20 meters in length. A vessel rented exclusively to or chartered for individuals for such purposes shall be considered a pleasure craft.

Pretreatment wash primer specialty coating means any coating that contains a minimum of 0.5 percent acid, by mass, and is applied only to bare metal to etch the surface and enhance adhesion of subsequent coatings.

Repair and maintenance of thermoplastic coating of commercial vessels (specialty coating) means any vinyl, chlorinated rubber, or bituminous resin coating that is applied over the same type of existing coating to perform the partial recoating of any in-use commercial vessel. (This definition does not include coal tar epoxy coatings, which are considered "general use" coatings.)

Rubber camouflage specialty coating means any specially formulated epoxy coating used as a camouflage topcoat for exterior submarine hulls and sonar domes.

Sealant for thermal spray aluminum means any epoxy coating applied to thermal spray aluminum surfaces at a maximum thickness of 1 dry mil.

Ship means any marine or fresh-water vessel used for military or commercial operations, including self-propelled vessels, those propelled by other craft (barges), and navigational aids (buoys). This definition includes, but is not limited to, all military and Coast Guard vessels, commercial cargo and passenger (cruise) ships, ferries, barges, tankers, container ships, patrol and pilot boats, and dredges. Pleasure crafts and offshore oil and gas drilling platforms are not considered ships.

Shipbuilding and ship repair operations means any building, repair, repainting, converting, or alteration of ships.

Special marking specialty coating means any coating that is used for safety or identification applications, such as markings on flight decks and ships' numbers.

Specialty coating means any coating that is manufactured and used for one of the specialized applications described within this list of definitions.

Specialty interior coating means any coating used on interior surfaces aboard U.S. military vessels pursuant to a coating specification that requires the coating to meet specified fire retardant and low

toxicity requirements, in addition to the other applicable military physical and performance requirements.

Tack specialty coating means any thin film epoxy coating applied at a maximum thickness of 2 dry mils to prepare an epoxy coating that has dried beyond the time limit specified by the manufacturer for the application of the next coat.

Thinner means a liquid that is used to reduce the viscosity of a coating and that evaporates before or during the cure of a film.

Thinning ratio means the volumetric ratio of thinner to coating, as supplied.

Thinning solvent: see Thinner.

Undersea weapons systems specialty coating means any coating applied to any component of a weapons system intended to be launched or fired from under the sea.

Volatile organic compound (VOC) means any organic compound that participates in atmospheric photochemical reactions; that is, any organic compound other than those that the Administrator designates as having negligible photochemical reactivity. VOC is measured by a reference method, an equivalent method, an alternative method, or by procedures specified under any regulation. A reference method, an equivalent method, or an alternative method, however, may also measure nonreactive organic compounds. In such cases, any owner or operator may exclude the nonreactive organic compounds when determining compliance with a standard. For a list of compounds that the Administrator has designated as having negligible photochemical reactivity, refer to 40 CFR 51.00.

Volatile organic hazardous air pollutant (VOHAP) means any compound listed in or pursuant to section 112(b) of the Act that contains carbon, excluding metallic carbides and carbonates. This definition includes VOC listed as HAP and exempt compounds listed as HAP.

Weld-through preconstruction primer (specialty coating) means a coating that provides corrosion protection for steel during inventory, is typically applied at less than 1 mil dry film thickness, does not require removal prior to welding, is temperature resistant (burn back from a weld is less than 1.25 centimeters [0.5 inches]), and does not normally require removal before applying film-building coatings, including inorganic zinc high-build coatings. When constructing new vessels, there may be a need to remove areas of weld-through preconstruction primer due to surface damage or contamination prior to application of film-building coatings.

APPENDIX C

LIST OF ESTIMATED NESHAP MAJOR-SOURCE SHIPYARDS

U.S. SHIPYARDS ESTIMATED TO BE NESHAP MAJOR SOURCES[a]

Type	Shipyard	Location	Workforce
Large Construction (6)	Jeffboat	Jeffersonville, IN	700
	Ingalls	Pascagoula, MS	16,700
	NNS	Newport News, VA	26,000
	General Dynamics (Electric Boat)	Groton, CT	15,300
	Bath Iron Works	Bath, ME	5,900
	Avondale	New Orleans, LA	7,200
Large Repair (4)	West State, Inc.[b]	Portland, OR	800
	Norshipco	Norfolk, VA	3,000
	Norfolk Naval	Norfolk, VA	11,300
	Portland Ship Repair	Portland, OR	2,000
Medium Construction (8)	Equitable Yards (Halter Marine)	New Orleans, LA	600
	Moss Point Marine (Halter Marine)	Escatawpa, MS	450
	NASSCO	San Diego, CA	4,000
	BethShip	Sparrows Point, MD	700
	McDermott Inc.	Amelia, LA	800
	Bollinger	Lockport, LA	740
	Gretna Machine (Halter Marine)	Harvey, LA	150
	Platzer	Houston, TX	200
Medium Repair (17)	Todd Shipyards	Seattle, WA	850
	Lockport Shipyard (Halter Marine)	Lockport, LA	350
	Philadelphia Naval[b]	Philadelphia, PA	7,100

APPENDIX D

EXAMPLE INITIAL NOTIFICATION

July 8, 1996

EPA Region IX
Director, Air and Radiation Division
75 Hawthorne St.
San Francisco, CA 94105

RE: 40 CFR PART 63, SUBPART II
National Emission Standards for Shipbuilding and Ship Repair (Surface Coating)

Dear Sir:

This is to notify you that National Steel & Shipbuilding Co. at Harbor Dr. and 28th St., San Diego, CA currently has a potential to emit of hazardous air pollutants (HAPs) in amounts greater than 25 tons per year of all combined HAPs and 10 tons per year of an individual HAP. As a result of our coating operations, National Steel & Shipbuilding Co. is, therefore, classified as a "major" source for hazardous air pollutants and is subject to the requirements of the National Emission Standards for Shipbuilding and Ship Repair (Surface Coating) Maximum Achievable Control Technology (MACT). We understand that the new submittal date for the implementation plan is December 16, 1996 and that the new compliance date is December 16, 1997.

Sincerely,

NATIONAL STEEL & SHIPBUILDING CO.

Dan Buell
Environmental Engineering Specialist

HARBOR DRIVE AND 28TH STREET • SAN DIEGO, CA 92113 • P.O. BOX 85278 • SAN DIEGO, CA 92186-5278
TELEPHONE (619) 544-3400 • TWX (910) 335-1250 • TELEX 695034

APPENDIX E

EXAMPLE IMPLEMENTATION PLAN

The following "Shipyard MACT Implementation Plan" was prepared by Mr. Dana Austin of Austin Environmental, Inc. for NSRP, Task N1-92-2, Subtask 12.

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1. COATING COMPLIANCE PROCEDURES

AOK Shipyards intends to implement the following option(s) in compliance with 40 CFR §63:

- **G** Option 1 - No thinning solvent added
- **G** Option 2 - Thinning solvent added, Coating-by-coating compliance
- **G** Option 3 - Thinning solvent added, Thinner group compliance
- **G** Option 4 - Alternative test method (i.e., other than Method 24)

Our approach to ensure MACT compliance is to integrate the additional requirements into existing work practices and to assign responsibilities to the appropriate organizational level in the company. Fig. 1-1 presents a cross reference matrix identifying organizational elements and their involvement in MACT implementation.

Fig. 1-1
Organizations Performing MACT Compliance Activities

MACT Compliance Activity		Initial Review	Receipt of Coatings	Certification	Dilution	Inspection	Mixing	Application	Reporting	Records	Testing
Option(s)		All	All	All	2, 3 & 4	All	2, 3 & 4	All	All	All	All
Organization	Purchasing	X								X	
	Receiving		X	X		X				X	X
	Environmental				X				X	X	X
	Paint Dept.			X						X	
	Paint Crew					X	X	X		X	

1.0 COATING IDENTIFICATION AND CERTIFICATION (ALL OPTIONS)

1.0.1 Coating Identification

Coating identification will be made in conjunction with the existing normal business activities required for the receipt of goods within the facility. Specifically, the warehouseman, receiving clerk, paint foreman, or other designated person will be responsible for determination of the coating category[1] and VOHAP limit of each batch of coating received into the facility. This will be accomplished using information gathered from the company purchase order, bills of lading, and/or coating container labels. This information will be recorded on the *Coating Compliance Certification* form.[2]

[This activity meets the requirements of 40 CFR §63.785(a)(1) and -(2)]

1.0.2 VOC or VOHAP Content Above Limit

For its specific coating category, any batch of coating with an identified VOC or VOHAP content above the limit shown in the form will be rejected and returned to the supplier, customer, or government.

[This activity meets the requirements of 40 CFR §63.783(a)]

Identification codes for the categories prescribed in 40 CFR §63.783 are as follows:

G1	General use	S8	Military exterior	S15	Repair/ maintenance of thermoplastics
S1	Air flask	S9	Mist	S16	Rubber camouflage
S2	Antenna	S10	Navigational aids	S17	Sealant for thermal spray aluminum
S3	Antifoulant	S11	Nonskid	S18	Special marking
S4	Heat resistant	S12	Nuclear	S19	Specialty interior
S5	High-gloss	S13	Organic zinc	S20	Tack coat
S6	High-temperature	S14	Pretreatment wash primer	S21	Undersea weapons systems
S7	Inorganic zinc high-build			S22	Weld-through precon. primer

Forms are located in ***Appendix A, Forms***.

1.0.3 Unknown VOC Content

The Purchasing Supervisor will be notified if the VOC content of any batch of coating cannot be identified. At his discretion, The Purchasing Supervisor may reject the batch and return it to the supplier, customer, or government; or, provisionally accept the batch pending further analysis using Method 24. If Method 24 tests are performed, the test results will be recorded on the *Method 24 Test Results Log* form.

[This activity meets the requirements of 40 CFR §63.783(a) and §63.788(b)(2)(vi)]

1.0.4 Container Inspection

We plan to use direct inspection of every equipment item (e.g., container, drum, vessel, vat, tank, pipe, etc.) involved in coating application to determine its integrity (see Section 3.1, *Self Inspection*). As applied to coating identification and certification, this involves at least receiving personnel, the Paint Shop Foreman, the Paint Crew Lead Men, and the Environmental personnel.

[This activity meets the requirements of 40 CFR §63.783(b)]

The warehouseman, receiving clerk, paint foreman, or other designated person will be responsible for inspecting the containers as received and completing the *Container Compliance* form for the receiving activity. Leaking containers or equipment will be identified and handled according to company spill handling procedures. The paint shop personnel will reinspect containers delivered for each day's activities, and inspect paint mixing, handling, and application equipment items. Any discrepancies will be reported to the Paint Shop Foreman, who will alert the spill response teams and/or maintenance crews to take appropriate action.

We will document these findings on the *Container Compliance* form, which will serve as a permanent record of ongoing inspections.

[This activity meets the requirements of 40 CFR §63.788(b)(2)(vi)]

1.1 OPTION 1 and OPTION 4

1.1.1 Certification

The Paint Department foreman, leadman, or supervisor will certify VOC (VOHAP) content "as-applied" prior to application of the work site using the *Coating Compliance Certification* form. This form will be returned to the Paint Department clerk, foreman, or supervisor at the end of the work shift.

[This activity satisfies the requirements of 40 CFR §63.785(c)(1)(I)]

Additionally, the volume of coating applied during the shift will be recorded by the paint crew foreman at the end of the work shift using the *Paint Crew Usage* form. Likewise, this form will be returned to the Paint Department clerk, foreman, or supervisor at the end of the work shift for recording in the *Paint and Thinner Usage Log*.

1.1.2 Notification

The Paint Department clerk, foreman, or company Environmental manager will maintain MACT compliance by notification of painters of the designated thinners by use of labels. The *"No Thinning"* label, will be used for this purpose. Alternatively, when use of labels is not practical or warranted, paint department gang box meetings, held prior to each work shift, will be used to notify painters that no thinning is allowed.

[This activity satisfies the requirements of 40 CFR §63.785(c)(1)(ii)]

1.2 OPTION 2, OPTION 3 and OPTION 4

1.2.1 Calculation of Thinning Ratios

The Paint Department clerk, foreman, or environmental manager will maintain MACT compliance by preparing required information on marine coatings to ensure compliance with MACT standards, including

(I) VOC Data Sheets, and

(ii) Thinning Ratio Calculations

The *VOC Data Sheet*, will be used to record the properties of marine coatings or thinners "As-Supplied." Note that this form accounts for exempt compounds and cure volatiles omitted from the VOC Data Sheet when the MACT was published, but necessary to complete the calculations. The *VOC Data Sheet* and attachments are provided as Appendix B.

Thinning ratio calculations will be completed before the application of each batch, using the equation 1, as provided in the MACT:

FOR OPTION 2 and OPTION 3:

where:

R = Maximum allowable thinning ratio for a given batch (L thinner/L coating as supplied);

V_s = Volume fraction of solids in the batch as supplied (L solids/L coating as supplied);

VOHAP limit = Maximum allowable as-applied VOHAP content of the coating (g VOHAP/L solids);

m_{VOC} = VOC content of the batch as supplied. [g VOC (including cure volatiles and exempt compounds on the HAP list)/L coating (including water and exempt compounds) as supplied];

D_{th} = Density of the thinner (g/L).

FOR OPTION 4:

where:

R = Maximum allowable thinning ratio for a given batch (L thinner/L coating as supplied);

V_s = Volume fraction of solids in the batch as supplied (L solids/L coating as supplied);

VOHAP limit = Maximum allowable as-applied VOHAP content of the coating (g VOHAP/L solids);

m_{VOHAP} = VOHAP content of the batch as supplied. [g VOHAP (including cure volatiles and exempt compounds on the HAP list)/L coating (including water and exempt compounds) as supplied];

$D_{th(VOHAP)}$ = Average density of the VOHAP thinner(S) (g/L).

Thinning Ratio Calculation Sheets for both Options 2 and 3, and Option 4 are provided in Appendix B.

Note: If V_s is not supplied directly by the coating manufacturer, V_S both Option 2 and Option 3, and Option 4 calculations will be determined using equation 2 as given by the MACT:

$$V_s \text{ ' } 1 \text{ \& } \frac{m_{volatiles}}{D_{avg}}$$ **Eqn.**

where:

$m_{volatiles}$ = Total volatiles in the batch, including VOC, water, and exempt compounds (g/L coating), and

D_{avg} = Average density of volatiles in the batch (g/L).

1.2.2 Notification

The Paint Department clerk, foreman, or company Environmental manager will maintain MACT compliance by notification of painters of the designated thinners by use of labels. The "*Maximum Allowable Thinning Ratio*" label, will be used for this purpose. Alternatively, when use of labels is not practical or warranted, paint department gang box meetings, held before each work shift, will be used to notify painters that no thinning is allowed.

[This activity satisfies the requirements of 40 CFR §63.785(c)(2)(ii) and -(3)(ii)]

1.2.3 Paint Crew Daily Records

The paint crew foreman, leadman, or supervisor will be responsible for recording the ambient temperature, the actual volumes used for each coating, the total allowable thinner volume, and the actual volume of thinner used. This form will be returned to the Paint Department clerk, foreman, or supervisor at the end of the work shift for recording in the *Paint and Thinner Usage Log*.

[This activity meets the requirements of 40 CFR §63.785(c)(2)(iii), and -(3)(iii)]

1.2.4 Thinner Group Designation "By Use"

The coatings grouped with a particular thinner will be determined "by use," i.e., if a thinner is used with a particular coating during the monthly reporting period, then that coating has been "designated" to that thinner group.

[This activity meets the requirements of 40 CFR §63.785(c)(3)(I)]

1.2.5 Determination of Compliance

At the end of each calendar month, the Paint Department clerk will provide the master coating and thinner usage log to the designated responsible person, who will determine compliance for that period. MACT compliance determination under Options 2 and 3 will be completed for the previous month by the 15th day of each month. The data will be evaluated using Equation 3 of the Rule, as follows:

$$V_{th} = \sum_{i=1}^{n} (R \times V_b)_i + \sum_{i=1}^{n} (R_{cold} \times V_{b\&cold})_i \qquad \textbf{Eqn.}$$

where:

V_{th} = Total allowable volume of thinner for the previous month (L thinner);

Vb = Volume of each batch, as supplied and before being thinned, used during non-cold-weather days of the previous month (L coating as supplied);

R_{cold} = Maximum allowable thinning ratio for each batch used during cold-weather days (L thinner/L coating as supplied);

$V_{b\text{-}cold}$ = Volume of each batch, as supplied and before being thinned, used during cold-weather days of the previous month (L coating as supplied);

I = Each batch of coating; and

n = Total number of batches of the coating.

[This activity meets the requirements of 40 CFR §63.785(c)(2)(iii), -(2)(iv), -(2)(v), -(2)(vi), (3)(iv), -(3)(v), -(3)(vi), and -(3)(vii).]

2. RECORD KEEPING PROCEDURES

The Paint Department clerk, foreman, and environmental manager will maintain all MACT compliance RECORD KEEPING information, including the information listed below, as required for each Option used during the reporting period. Records will be maintained for five years. Reporting will be provided before the 60th day following completion of each 6-month period after the compliance date. (Note: Some RECORD KEEPING items are not reported.)

BASIC CHECKLIST
9 Initial Notification Documentation *
9 Approved Implementation Plan *
9 Volume of Low-Usage -Exempt Coatings by Month
9 Identification of coatings used, EPA categories, and VOHAP limits
9 Certification of As-Supplied VOC Content for each Batch of Coating *
9 Determination whether containers meet standard §63.783(b)(2)
9 Results of Method 24 or other approved measurements on individual containers

OPTIONS	1 & 4	2 & 4	3 & 4
9 Certification of As-Applied VOC content by Batch *	X		
9 Volume of each coating applied	X		
9 Thinner Density and Vol Fraction Solids for each Batch*		X	X
9 Maximum Allowable Thinner Ratio for each Batch		X	X
9 Volume Used of each Batch, (As-Supplied)		X	X
9 Cold weather dates and times		X	X
9 Total Allowable Volume of thinner		X	X
9 Actual Volume of thinner		X	X
9 ID of coating groups/thinner			X

* Maintained on site but not reported.

[This activity satisfies the requirements of 40 CFR §63.788]

3. TRANSFER, HANDLING, AND STORAGE PROCEDURES

Our company management policy takes a proactive role in the development of measures to minimize the likelihood for air pollution. We therefore develop procedures, practices, and equipment on an ongoing basis. The sections below discuss our policy with respect to work practices, and to self-inspection, respectively.

3.0 Work Practices

Regarding the transfer and handling of VOHAP-containing materials in a way that minimizes spills, the following elements of our policy are of particular relevance:

(1) Maintain a neat and orderly work environment including storing hazardous materials and wastes in a way that minimizes the potential for accidental releases.

(2) Keep lids on liquid volatile material containers when not directly in use.

(3) Practice clean up procedures to ensure that accidentally spilled solvents and paints are cleaned-up immediately.

(4) Store solvent contaminated rags, cloths, and materials in a covered container.

(5) Keep drums closed when not in use and equip drums with tight-fitting lids.

(6) Use funnels when filling and replace the cap covering the hole once filling is completed (or replace the funnel's lid, if used).

(7) Dispose of solvent-wipe rags immediately in a covered container.

(8) Apply the volatile solvents directly to the rag and avoid spraying solvent directly on the surface.

(9) Avoid the use of VOCs for surface preparation whenever possible (i.e., substitute aqueous cleaners where possible).

(10) Maintain paint guns and pots to minimize the potential for leaks and improper spraying. (See also section 3.1, *Self-Inspection*, below.)

(11) Clean lines or paint guns in a closed system to capture solvents.

(12) Provide containment for VOC-containing material storage areas.

(13) Perform mixing and transfer operations only in designated areas with containment.

[This activity meets the requirements of 40 CFR §63.783(b)(1)]

3.1 Self-Inspection

Our facility policy already prescribes reactions to malfunctions and/or leaks both by maintenance crews and by spill response teams. There are existing notification protocols to alert the appropriate response organization. Effectively, we use self-inspection of every equipment item (e.g., container, drum, vessel, vat, tank, pipe, etc.) involved in coating application to determine its integrity. This strategy is executed for every activity and every organizational level associated with coating materials and thinning solvents, from initial receipt within the facility to final application.

[These policies and procedures meet the requirements of 40 CFR §63.783(b)(2).]

For compliance with MACT RECORD KEEPING requirements, we plan to document container self-inspection findings on the *Container Compliance* Form. This form will serve as a permanent record, and will be maintained for a minimum of 5 years.
[This activity assures compliance with 40 CFR §63.788(b)(2)(vi).]

Attachment A: FORMS

A-OK SHIPYARDS COATING COMPLIANCE CERTIFICATION

9 AS SUPPLIED 9 AS APPLIED

ID	Item	Description	Data
A.	Coating	Name/ Identification	
B.	Coating Manufacturer	Name	
C.	Batch Identification	Count/Volume	
D.	Supplied By	Source (check one)	9 Customer 9 Manufacturer 9 Government
E.	VOC Content	Concentration, g/L	
		Source (check one)	9 Batch test data (M-24) 9 VOC Data Sheet
F.	Coating Category (check one below)	Code Description	VOC Limit, grams/liter coating
	General	9 G1 General use	340
	Specialty	9 S1 Air flask	340
		9S2 Antenna	530
		9S3 Antifoulant	400
		9S4 Heat resistant	420
		9S5	

A-OK SHIPYARDS PAINT CREW USAGE FORM

MONTH OF _____

JOB ID_____ CREW ID_____ DATE _____

Requirement	Activity	Item***	Description	Value
MACT	COATING (Complete Before Work)	(1)	Mfg. Name	
		(2)	ID	
		(3)	Batch	
		(4)	EPA Category (Note 1)	
		(5)	VOC Limit	
	THINNER (Complete Before Work)	(6)	Manufacturer's Name	
		(7)	ID	
		(8)	Mix Ratio, Normal	
		(9)	Mix Ratio, Cold	
		(10)	Actual Coating Volume	
	MIXING	(11)	Allowable Thinner Vol, Normal	
		(12)	Allowable Thinner Vol, Cold	
		(13)	Actual Thinner Volume	
		(14)	Temperature < 40‹F (Y/N)	
		(15)	Actual Temp (‹F)	
		(16)	Final Volume (Note 2)	
		(17)	Volume Applied	
CERTIFICATION		(21)	Date	
		(22)	By	

Note 1: EPA Coating Categories are identified below:

General

G1 General Use

Specialty

S1 Air flask
S2 Antenna
S3 Antifoulant
S4 Heat resistant
S5 High-gloss
S6 High-temperature
S7 Inorganic zinc high-build
S15 Repair/ maintenance of thermoplastics
S16 Rubber camouflage
S17 Sealant for thermal spray aluminum
S18 Special marking
S19 Specialty interior
S20 Tack coat
S21 Undersea weapons systems
S22 Weld-through precon. primer

Note 2: (16) = (10) + (12)

From Paint and Thinner Usage Log

S8 Military exterior
S9 Mist
S10 Navigational aids
S11 Nonskid
S12 Nuclear
S13 Organic zinc
S14 Pretreatment wash primer

A-OK SHIPYARDS CONTAINER COMPLIANCE FORM
MONTH OF _____

(1) Inspection Date	(2) By	(3) Equipment ID/No.	(4) Reference Drawing	(5) Cracks (Y/N)	(6) Holes (Y/N)	(7) Other (Y/N)	(8) Closed (Y/N)

A-OK SHIPYARDS METHOD 24 TEST RESULTS FORM [1]
MONTH OF _____

		THINNER		COATING						
(1) Date	(2) Basis	(3) Mfg. Name	(4) ID	(5) Mfg. Name	(6) ID	(7) Batch	(8) EPA Category	(9) VOC Limit	(10)	(11)

A-OK SHIPYARDS PAINT AND THINNER USAGE LOG [1]
MONTH OF _____

G OPTION 2: Coating Group _____ **G** OPTION 3: Thinner Group _____

MACT REQUIREMENTS																	VOHAP EMISSIONS CALCULATIONS			CERTIFICATION	
COATING (Complete Before Work)					THINNER (Complete Before Work)				MIXING												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
							Mix Ratio			Allowable Thinner Volume											
Mfg. Name	ID	Batch	EPA Cat.	VOC Limit	Mfg. Name	ID	Norm	Cold	Actual Coating Volume	Norm	Cold	Actual Thinner Volume	Temp < 40 <F (Y/N)	Actual Temp (<F)	Final Volume	Vol Applied	Coating Usage	Thinner Usage	Waste	Date	By

Note (4) Select EPA Category from list below

Note (16) (16) = (10) + 13)

Note (18) (18) = (17)*(10)/(16)

Note (19) (19) = (17)*(12)/(16)

Note (20) (20) = (16) - (17)

GENERAL
G1 General use

SPECIALTY
S1 Air flask
S2 Antenna
S3 Antifoulant
S4 Heat resistant
S5 High-gloss
S6 High-temperature
S8 Military exterior
S9 Mist
S10 Navigational aids
S11 Nonskid
S12 Nuclear
S13 Organic zinc
S14 Pretreatment wash primer
S15 Repair and maintenance of thermoplastics
S16 Rubber camouflage
S17 Sealant for thermal spray aluminum
S18 Special marking
S19 Specialty interior
S20 Tack coat
S21 Undersea weapons systems
S22 Weld-thru precon primer

[1] In compliance with 40 CFR Part 63.788(b)(2).

NO THINNING LABEL

NO THINNING

In compliance with 40 CFR Part 63.785.
Contact Paint Foreman or _____.

Maximum Allowable Thinning Label

Maximum Allowable Thinning Ratio	
Ratio	**Normal ($ 40 EF)** _____ **Cold (< 40 EF)** _____
Thinner	***USE NO SUBSTITUTES*** **(1)** **Mfg. Name** _____ **Product ID** _____ **Use no more than _____ gal thinner per gallon paint.**
(1)	**In compliance with 40 CFR Part 63.785. Contact Paint Foreman or _____.**

MARINE COATING ALLOWABLE THINNING RATIO CALCULATION SHEET (SIDE 1) FOR OPTIONS 2 AND 3

A	**Coating**	**Batch Number** _____ **Manufacturer** _____ **ID** _____ **Category** _____
B	**Thinner**	**Manufacturer** _____ **ID** _____

Step	Instructions (Use VOC data collection sheet for this batch of coating)	Calculations
1	Enter V_S the volume fraction solids in the batch, as supplied, (liter solid/ liter coating) on lines 1a and 1b.	1a _____ % 1b _____ %
2	Enter ***VOHAP LIMIT***, for normal and for cold operation, based on the coating category (see side 2)	t $ 4.5EC t < 4.5EC 2a _____ 2b _____
3	Multiply line 1a times line 2a and enter the results on line 3a. Multiply line 1b times line 2b and enter the results on line 3b.	3a _____ 3b _____
4	Calculate M_{voc} the VOC Content of the Batch	

A	**Coating**	**Batch Number** _____ **Manufacturer** _____ **ID** _____ **Category** _____
B	**Thinner**	**Manufacturer** _____ **ID** _____

MARINE COATING ALLOWABLE THINNING RATIO CALCULATION SHEET (SIDE 1) FOR OPTIONS 4

A	**Coating**	**Batch Number** _____ **Manufacturer** _____ **ID** _____ **Category** _____
B	**Thinner**	**Manufacturer** _____ **ID** _____

Step	Instructions (Use VOC data collection sheet for this batch of coating)	Calculations
1	Enter V_s the volume fraction solids in the batch, as supplied, (liter solid/ liter coating) on lines 1a and 1b.	1a _____ % 1b _____ %
2	Enter ***VOHAP LIMIT***, for normal and for cold operation, based on the coating category (see side 2)	t $ 4.5EC t < 4.5EC 2a _____ 2b _____
3	Multiply line 1a times line 2a and enter the results on line 3a. Multiply line 1b times line 2b and enter the results on line 3b.	3a _____ 3b _____
4	Enter the VOHAP content, grams/liter, of the batch on lines 4a and 4b. ***Note: VOHAP content was determined using EPA approved test method:***	4a _____ 4b _____
5	Subtract line 4a from 3a and enter results on line 5a. Subtract line 4b from 3b and enter result on line 5b. STOP if negative. See Supervisor.	5a _____ 5b _____
6	Enter $D_{thvohap}$ the average Density of the VOHAP Thinners, grams/liter, on lines 6a and 6b.	6a_____ 6b_____
7	Divide line 5a by line 6a and enter result on line 7a . Divide line 5b by line 6b and enter result on line 7b.	R_N R_C 7a _____ 7b _____

8 **Enter line 7a: Use no more than _____ gallons thinner per gallon coating for normal temperatures.**

Enter line 7b: Use no more than _____ gallons thinner per gallon coating for cold temperatures.

A	**Coating**	**Batch Number** _____ **Manufacturer** _____ **ID** _____ **Category** _____
B	**Thinner**	**Manufacturer** _____ **ID** _____

MARINE COATING ALLOWABLE THINNING RATIO CALCULATION SHEET (SIDE 2)

Coating Category:			VOHAP limits grams/liter solids	
			t $ 4.5EC	t < 4.5EC
General	G1	General use	571	728
Specialty	S1	Air flask	571	728
	S2	Antenna	1,439	--
	S3	Antifoulant	765	971
	S4	Heat resistant	841	1,069
	S5			

Attachment B:
MARINE COATING
DATA SHEETS

VOC DATA SHEET

PROPERTIES OF THE MARINE COATING OR THINNER "AS SUPPLIED" BY THE MANUFACTURER

Manufacturer:_____ Product Identification:_____

Is this product a coating or thinner? COATING_____ THINNER_____

If product is a coating or paint please provide the information in the box below and provide all information for Items A though J below:

MACT Coating Category: General Use____ or Specialty Coating _____ If Coating is a Specialty Coating please list the specific Category type(s) below.(Use attached list of marine coating specialty categories):

If the product is thinner or reducer, please provide the information requested in Items D though J below:

Properties of the coating or thinner as supplied to the customer:

A. Coating Density: (D_c) _____ g/L [ ] ASTM D1475-90 [ ] Other

B. Total Volatiles: (M_v) _____ Mass Percent [ ] ASTM D2369-93 [ ] Other

C. Cure Volatiles Content: (C_{cv}) _____ g/L [ ] Calculated [ ] Other

D. Organic Volatiles: (M_o) _____ Mass Percent [ ] Calculated [ ] Other

E. Water Content:

1. (M_w) _____ Mass Percent [ ] ASTM D3792-91 [ ] ASTM D4017-90 [ ] Other

2. (V_w) _____ Volume Percent [ ] Calculated [ ] Other

F. Exempt Compounds Content: (C_{ex}) _____ g/L [ ] Calculated [ ] Other

G. Nonvolatiles: (V_s) _____ Volume Percent [ ] Calculated [ ] Other

H. VOC Content (VOC):

1. _____ g/L solids (nonvolatiles)

2. _____ g/L coating (less water and exempt compounds)

I. Thinner Density: (D_{th})_____g/L ASTM _____ [ ] Other

J. Coating Speciation: Provide the percentage of each chemical component of this coating or thinner. (If only a percentage range can be supplied, the range mean will be used to calculate VOC and HAP emissions.) This information is not required for compliance with the shipyard MACT, however other federal and/or state environmental regulations require this data. By providing this information now it will avoid the possibility that the shipyard will make redundant requests for the data in the future.

COATING OR THINNER COMPONENT	**MASS PERCENTAGE**

Nonvolatile Components, Water and Exempt Compounds

1._____	_____
2._____	_____
3._____	_____
4._____	_____
5._____	_____
6._____	_____
7._____	_____
8._____	_____
9._____	_____
10._____	_____

Organic Volatile Components:

1._____	_____
2._____	_____
3._____	_____
4._____	_____
5._____	_____
6._____	_____
7._____	_____
8._____	_____
9._____	_____
10._____	_____

Signed: _____ Dated: _____

--English units in the original submittal were deleted to conform with Appendix A in the final regulation (60 FR 64330).

VOLATILE ORGANIC HAP (VOHAP) LIMITS FOR MARINE COATINGS

Coating Category	VOHAP limits[a,b,c]		
	grams/liter coating (minus water and exempt compounds)	grams/liter solids[d]	
		t $ 4.5EC	t < 4.5EC[e]
General use	340	571	728
Specialty	--	--	--
Air flask	340	571	728
Antenna	530	1,439	--
Antifoulant	400	765	971
Heat resistant	420	841	1,069

Shipyard MACT Marine Coating Expressions and Equations

Fraction	Constituents	Volume Expression	Mass Expression
Organic	Volatile Organic Compounds	V_{VOC}	M_{VOC}
	Exempt-Volatiles	V_E	M_E
Aqueous	Water	V_W	M_W
Solid	Non-Volatiles	V_S	M_S
"Cure-Volatiles"	Reaction Volatiles		M_C

		Coating Property	Expression	Units
A	D_C	Coating Density	$\Sigma M_i / \Sigma V_i$	grams/liter
B*	M_T	Total Volatiles (mass percent)	$(M_{VOC} + M_E + M_W + M_c) / \Sigma M_i$	%
C	C_{cv}	Cure Volatiles Content	$M_C / \Sigma V_i$	grams/liter
D	M_V	Organic Volatiles (mass percent)	$(M_V + M_E) / \Sigma M_i$	%
E_1	M_W	Water Content (mass percent)	$M_W / \Sigma M_i$	%
E_2	V_W	Water Content (volume percent)	$V_W / \Sigma V_i$	%
F	C_{ex}	Exempt Compounds Content****	$M_E / \Sigma V_i$	grams/liter
G	V_S	Nonvolatiles (volume percent)	$V_S / \Sigma V_i$	%
H_1*		VOC Content (nonvolatiles)	$(M_{VOC}) / V_S$	grams/liter
H_2*		VOC Content (less water & exempt compounds)	$(M_{VOC}) / (V_S + V_{VOC})$	grams/liter
I	D_{TH}	Thinner Density	$\Sigma M_i / \Sigma V_i$	grams/liter

*Edited to conform with 60 FR 64330 symbols

Acetone was recently identified to have a low photochemical reactivity, as a result it was added to the list of "exempt" compounds. When Method 24 in 40 CFR Part 60 was published, acetone was considered a VOC. Therefore, the method that will be used to determine the acetone content in a coating should be specified. This is also applicable to any new addition to the list of exempt compounds, unless an EPA approved test method already exists.

40 CFR 51.100 (s) - Exempt Compounds

(s) Volatile organic compounds (VOC) means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions.

(1) This includes any such organic compound other than the following, which have been determined to have negligible photochemical reactivity:

acetone;
methane;
ethane;
methylene chloride (dichloromethane);
1,1,1-trichloroethane (methyl chloroform);
1,1,1-trichloro-2,2,2-trifluoroethane (CFC-113);
trichlorofluoromethane (CFC-11);
dichlorodifluoromethane (CFC-12);
chlorodifluoromethane (CFC-22);
trifluoromethane (FC-23);
1,2-dichloro 1,1,2,2-tetrafluoroethane (CFC-114);
chloropentafluoroethane (CFC-115);
1,1,1-trifluoro 2,2-dichloroethane (HCFC-123);
1,1,1,2-tetrafluoroethane (HFC-134a);
1,1-dichloro 1-fluoroethane (HCFC-141b);
1-chloro 1,1-difluoroethane (HCFC-142b);
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124);
pentafluoroethane (HFC-125);
1,1,2,2-tetrafluoroethane (HFC-134);
1,1,1-trifluoroethane (HFC-143a);
1,1-difluoroethane (HFC-152a);
and perfluorocarbon compounds which fall into these classes:
(I) Cyclic, branched, or linear, completely fluorinated alkanes;
(ii) Cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
(iii) Cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
(iv) Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

(2) For purposes of determining compliance with emissions limits, VOC will be measured by the test methods in the approved State implementation plan (SIP) or 40 CFR part 60, appendix A, as applicable. Where such a method also measures compounds with negligible photochemical reactivity, these negligibly-reactive compounds may be excluded as VOC if the amount of such compounds is accurately quantified, and such exclusion is approved by the enforcement authority.

Attachment C:
COATING DEFINITIONS

General use coating

G1	General use coating	means any coating that is not a specialty coating.

Specialty coating

means any coating that is manufactured and used for one of the specialized applications described within this list of definitions.

S1	Air flask specialty coating	means any special composition coating applied to interior surfaces of high pressure breathing air flasks to provide corrosion resistance and that is certified safe for use with breathing air supplies.
S2	Antenna specialty coating	means any coating applied to equipment through which electromagnetic signals must pass for reception or transmission.
S3	Antifoulant specialty coating	means any coating that is applied to the underwater portion of a vessel to prevent or reduce the attachment of biological organisms and that is registered with the EPA as a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act.
S4	Heat resistant specialty coating	means any coating that during normal use must withstand a temperature of at least 204EC (400EF).
S5	High-gloss specialty coating	means any coating that achieves at least 85 percent reflectance on a 60 degree meter when tested by ASTM Method D523 (incorporation by reference--see §63.14).
S6	High-temperature specialty coating	means any coating that during normal use must withstand a temperature of at least 426EC (800EF).
S7	Inorganic zinc (high-build) specialty coating	means a coating that contains 960 grams per liter (8 pounds per gallon) or more elemental zinc incorporated into an inorganic silicate binder that is applied to steel to provide galvanic corrosion resistance. (These coatings are typically applied at more than 2 mil dry film thickness.)
S8	Military exterior specialty coating	or Chemical Agent Resistant Coatings ("CARC")means any exterior topcoat applied to military or U.S. Coast Guard vessels that are subject to

S12	Nuclear specialty coating	means any protective coating used to seal porous surfaces such as steel (or concrete) that otherwise would be subject to intrusion by radioactive materials. These coatings must be resistant to long-term (service life) cumulative radiation exposure (ASTM D4082-89 [incorporation by reference--see §63.14]), relatively easy to decontaminate (ASTM D4256-89 [reapproved 1994] [incorporation by reference--see §63.14]), and resistant to various chemicals to which the coatings are likely to be exposed (ASTM D3912-80 [incorporation by reference--see §63.14]). [Nuclear coatings should meet the general protective requirements outlined by the Department of Energy (formerly U.S. Atomic Energy Commission Regulatory Guide 1.54).]
S13	Organic zinc specialty coating	means any coating derived from zinc dust incorporated into an organic binder that contains more than 960 grams of elemental zinc per liter (8 pounds per gallon) of coating, as applied, and that is used for the expressed purpose of corrosion protection.
S14	Pretreatment wash primer specialty coating	means any coating that contains a minimum of 0.5 percent acid, by mass, and is applied only to bare metal to etch the surface and enhance adhesion of subsequent coatings.
S15	Repair and maintenance of thermoplastic coating/commercial vessels	means any vinyl, chlorinated rubber, or bituminous resin coating that is applied over the same type of existing coating to perform the partial recoating of any in-use commercial vessel. (This definition does not include coal tar epoxy coatings, which are considered "general use" coatings.)
S16	Rubber camouflage specialty coating	means any specially formulated epoxy coating used as a camouflage topcoat for exterior submarine hulls and sonar domes.
S17	Sealant for thermal spray aluminum	means any epoxy coating applied to thermal spray aluminum surfaces at a maximum thickness of 1 dry mil.
S18	Special marking specialty coating	means any coating that is used for safety or identification applications, such as markings on flight decks and ships' numbers.
S19	Specialty interior coating	means any coating used on interior surfaces aboard U.S. military vessels pursuant to a coating specification that requires the coating to meet specified fire retardant and low toxicity requirements, in addition to the other applicable military physical and performance requirements.
S20	Tack specialty coating	means any thin film epoxy coating applied at a maximum thickness of 2 dry mils to prepare an epoxy coating that has dried beyond the time limit specified by the manufacturer for the application of the next coat.
S21	Undersea weapons systems specialty coating	means any coating applied to any component of a weapons system intended to be launched or fired from under the sea.
S22	Weld-through preconstruction primer (specialty coating)	means a coating that provides corrosion protection for steel during inventory, is typically applied at less than 1 mil dry film thickness, does not require removal prior to welding, is temperature resistant (burn back from a weld is less than 1.25 centimeters [0.5 inches]), and does not normally require removal before applying film-building coatings, including inorganic zinc high-build coatings. When constructing new vessels, there may be a need to remove areas of weld-through preconstruction primer due to surface damage or contamination prior to application of film-building coatings.

APPENDIX F

EXAMPLE FORMS

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Example 1			124 Whi	150 Gree	5705 Haz	BRA	BRA	FPD05	KH	KH	CLC	Color T	a - Calcula b - Specifi	F = From

Index of Column Headings in Example 1.

Column	Description
A	Coating identification - by the supplier or manufacturer (include batch number)
B	Monthly usage (liters, L)
C	As-supplied VOC content of the batch of coating (grams per liter of coating, minus water and exempt solvents, g/L coating)
D	Applicable marine coating category (see Table 2 and/or definitions section of regulation)
E	Applicable maximum VOHAP limit (see Table 2 of regulation)
F	Average solvent density of the coating (grams per liter, g/L)
G	Volume of solids (nonvolatiles) in the as-supplied batch of coating (liters, L)
H	Maximum allowable thinning ratio (liters of thinning solvent per liter of as-supplied coating)
I	Thinning solvent identification - by the supplier or manufacturer
J	Density of the thinning solvent (grams per liter, g/L)
K	Total monthly volume of thinning solvent used to thin particular coating (liters, L)
L	Total monthly volume of thinning solvent allowed based on maximum allowable thinning ratio calculations for a particular coating (liter, L)
M	Compliance determination: Yes/No (Is the actual thinner usage less than or equal to the allowable thinner usage for the month?)

Example 2. TOTAL (MONTHLY) PAINT USAGE -- JUNE 1995

A	B	C	D	E	F	G	H	I	J	K	L
PAINT (COATINGS) DATA									THINNER DATA		
Paint ID	Usage (L)	VOC (g/L)	EPA Category	EPA LIMIT (g/L ctg)	EPA LIMIT (g/L solids	Avg Solvent Density(g/L)	Vol Solids (L)	Max Allow Thinning Rati	Thinner ID	Density (g/L)	Allowed Usage (L)
Ameron 385AME	270.6	276	Gen Use	340	571	845	0.673 [a]	0.14	N/A	800	---
Ameron 70ESP	1438.3	336	A/F	400	765	845	0.602 [a]	0.16	N/A	800	---
Ameron 3279	1.9	336	Hi Temp	500	1237	790	0.575 [a]	0.47	N/A	800	---
Devoe 235 BAR	2246.4	288	Gen Use	340	571	850	0.68 [b]	0.13	N/A	800	---
Devoe 233	36.0	288	Gen Use	340	571	855	0.663 [a]	0.11	N/A	800	---
Devoe ABC-3	2384.6	336	A/F	400	765	840	0.600 [a]	0.15	N/A	800	---
Devoe 379	586.7	312	Hi Gloss	420	841	860	0.637 [a]	0.26	N/A	860	---
Devoe F129	37.8	400	A/F	400	765	840	0.524 [a]	0.00	N/A	860	---
Hempel 58030-10420	18.9	176	Gen Use	340	571	900	0.804 [a]	0.35	N/A	800	---
Intl 484-C	5.7	400	A/F	400	765	840	0.524 [a]	0.00	N/A	888	---
Intl CLB000S	37.8	336	Hi Gloss	420	841	845	0.602 [a]	0.20	N/A	870	---
Intl CLB134S	3.8	338	Gen Use	340	571	845	0.600 [a]	0.01	N/A	870	---
Intl CLL274S	47.3	336	Gen Use	340	571	840	0.600 [a]	0.01	N/A	870	---

COATING-BY-COATING COMPLIANCE DEMONSTRATED

Example 2. TOTAL (MONTHLY) PAINT USAGE -- JUNE 1995 (continued)

A	B	C	D	E	F	G	H	I	J	K	L
PAINT (COATINGS) DATA									THINNER DATA		
Paint ID	Usage (L)	VOC (g/L)	EPA Category	EPA LIMIT (g/L ctg)	EPA LIMIT (g/L solids	Avg Solvent Density(g/L)	Vol Solids (L)	Max Allow Thinning Ratio	Thinner ID	Density (g/L)	Allowed Usage (L)
Intl BRA570	1430.7	336	A/F	400	765	855	0.607 [a]	0.15	GTA415	870	211.1
Intl EPA075/076V	15.1	336	Gen Use	340	571	840	0.600 [a]	0.01	GTA415	870	---
Intl EPA490/489	75.7	85	Gen Use	340	571	870	0.902 [a]	0.49	GTA415	870	37.4
Intl EPA491/489	102.2	85	Gen Use	340	571	870	0.902 [a]	0.49	GTA415	870	50.5
Intl FPL274/FPA327	3.8	190	Gen Use	340	571	870	0.782 [a]	0.29	GTA415	870	1.1
Intl FPJ034/327	11.4	190	Gen Use	340	571	870	0.782 [a]	0.29	GTA415	870	3.4
Intl FPY999/FPA327	548.8	190	Gen Use	340	571	870	0.782 [a]	0.29	GTA415	870	161.7
Intl KHA302/062	287.7	320	Gen Use	340	571	845	0.621 [a]	0.04	GTA415	870	11.5
Intl KHA303/062	403.1	320	Gen Use	340	571	845	0.621 [a]	0.04	GTA415	870	16.1
Intl TQA374/375	7.6	0	Gen Use	340	571	870	1.000 [a]	0.66	GTA415	870	5.0
Intl 990	15.1	326	Hi Gloss	420	841	855	0.619 [a]	0.22	GTA415	870	3.4
Porter 904	7.6	176	Gen Use	340	571	820	0.785 [a]	0.31	GTA415	870	2.4

a = Calculated using 1-(C/G)
b = Specified by manufacturer

GROUP COMPLIANCE

Total allowable thinner usage = 503.6 L
Total actual thinner usage = 352 L

APPENDIX G

EXAMPLE CALCULATIONS

CALCULATIONS FOR DEMONSTRATING COMPLIANCE

Equation 1 is to be used to calculate the maximum allowable thinning ratio, R:

$$R = \frac{(\text{Vol Solids})\ (\text{VOHAP limit}) - (\text{mass of VOC})}{\text{Density of thinner}}$$

For a General Use coating with a VOC content of 300 g/L of coating, you must determine how much thinner (with a density of 810 g/L) can be added to the coating. The average density of the solvents (volatiles) in the coating is 855 g/L.

In trying to calculate "R" using Equation 1, we have everything except volume solids in the coating.

In the absence of actual manufacturer's data, Equation 2 is used to calculate volume solids:

$$\text{Volume solids} = 1 - \frac{(\text{mass of volatiles})}{(\text{avg density of volatiles})}$$

$$\text{Volume solids} = 1 - \frac{(300\ \text{g/L})}{(855\ \text{g/L})} = 0.649$$

Having calculated volume solids, the maximum allowable thinning ratio can be determined:

$$R = \frac{(0.649)\ (571\ \text{g/l solids}) - (300\ \text{g/L})}{(810\ \text{g/L})} = 0.087\ \frac{\text{L thinner}}{\text{L coating}}$$

Equation 3 is to be used to calculate the total allowable volume of thinner used during the month:

$$\begin{array}{lcll} \text{Total allowable volume of Thinner} & = & \text{Sum of (R * volume of each batch used during non-cold weather days)} & + \\ & & & \text{Sum of (R * volume of each batch used during cold weather days)} \end{array}$$

If the total allowable volume of thinner (calculated using equation 3) is less than or equal to the actual volume of thinner used during the month, compliance is demonstrated.

NOTE: The proper mix ratio must be used for any multi-component coatings.

MARINE COATING ALLOWABLE THINNING RATIO CALCULATION SHEET (SIDE 1) FOR OPTIONS 2 AND 3

EXAMPLE

A	Coating BRA570	Batch Number UHA10675B Manufacturer International ID BRA570 Category Antifoulant - S3
B	Thinner GTA 415	Manufacturer International ID GTA 415

Step	Instructions (Use VOC data collection sheet for this batch of coating)	Calculations
1	Enter V_s the volume fraction solids in the batch, as supplied, (liter solid/ liter coating) on lines 1a and 1b.	1a 60 % 1b 60 %
2	Enter *VOHAP LIMIT*, for normal and for cold operation, based on the coating category (see side 2)	t ≥ 4.5°C: 2a 765; t < 4.5°C: 2b 971
3	Multiply line 1a times line 2a and enter the results on line 3a. Multiply line 1b times line 2b and enter the results on line 3b.	3a 459 3b 583
4	Calculate M_{voc} the VOC Content of the Batch Enter Method 24 *MV*, mass fraction Total Volatiles. 4.1 16 % Enter M_w the mass fraction Water. 4.2 0 % Subtract line 4.2 from line 4.1, enter difference. 4.3 16 % Enter D_c the Coating Density, grams/liter. 4.4 2184 Multiply line 4.3 times line 4.4, enter result on lines 4a and 4b.	4a 349 4b 349
5	Subtract line 4a from 3a and enter results on line 5a. Subtract line 4b from 3b and enter result on line 5b. STOP if negative. See Supervisor.	5a 110 5b 234
6	Enter D_{th} the Thinner Density, grams/liter, on lines 6a and 6b.	6a 870 6b 870
7	Divide line 5a by line 6a and enter result on line 7a. Divide line 5b by line 6b and enter result on line 7b.	7a R_N .126 7b R_C .269
8	Enter line 7a: Use no more than .13 gallons thinner per gallon coating for normal temperatures. Enter line 7b: Use no more than .27 gallons thinner per gallon coating for cold temperatures.	

EXAMPLE

VOHAP DATA SHEET:[1]
PROPERTIES OF THE COATING "AS SUPPLIED"
BY THE MANUFACTURER[2]

Coating Manufacturer: SHIP-COATINGS-R-US
Coating Identification: 1A-2B-3C (HIGH-TEMP)
Batch Identification: XXX-YYY-ZZZ
Supplied To: AOK SHIPYARD

Properties of the coating as supplied[2] to the customer:

A. Coating Density: $(D_c)_s$ 1000 g/L
: ASTM D1475-90 G Other[3]

B. Total Volatiles: $(m_v)_s$ 35 Mass Percent
: ASTM D2369-93 G Other[3]

C. Water Content:
1. $(m_w)_s$ 0 Mass Percent
: ASTM D3792-91 G ASTM D4017-90 G Other[3]
2. $(v_w)_s$ 0 Volume Percent
: Calculated G Other[3]

D. HAP Volatiles: $(m_{HAP})_s$ 15 Mass Percent

E. Nonvolatiles: $(v_n)_s$ 38 Volume Percent
: Calculated G Other[3]

F. VOHAP Content $(VOHAP)_s$:
1. 231 g/L solids (nonvolatiles)
2. 150 g/L coating (less water and NON-vong

TECHNICAL REPORT DATA

(Please read Instructions on reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-453/R-97-001		

4. TITLE AND SUBTITLE	5. REPORT DATE
A Guidebook on How to Comply with the Shipbuilding and Repair (Surface Coating) Operations National Standards for Hazardous Air Pollutants	January 1997
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
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15. SUPPLEMENTARY NOTES

16. ABSTRACT

This guidebook provides an overview of the shipbuilding and ship repair regulation. It is not a complete statement of the legal and technical requirements of the regulation: 60 FR